

BRASS WORLD

AND

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Experimental Sweating of Automobile Radiators

By DR. JAMES SILBERSTEIN

WRITTEN ESPECIALLY FOR BRASS WORLD

THE following experiments were carried out to determine the amount of solder that can be sweated off automobile radiators and to find out if there is any difference between tubular and honeycombed radiators with regard to the solder contained.

Since the average weight of a radiator, exclusive of iron, is around 25 lbs., and since a large number of automobiles—in the neighborhood of 2,000,000—are scrapped every year, the yearly tonnage amounts to about 50,000,000 lbs., which is brought on the metal market. In the old days the radiators were built of copper (the iron or steel shells around the radiators and other iron or steel parts of the radiators are not being paid for by the metal dealer and are not being considered in this investigation) and the solder employed was of the "half and half" type. Nowadays brass is generally used in place of copper, and the "half and half" solder is substituted by solders of lower tin content.

Usual Method

The method ordinarily employed in treating automobile radiators consists in sweating off the solder in a reverberatory furnace. The products of this process are solder ingot, dross, brass to which a certain amount of solder is fused and containing also some iron, and iron. The dross contains large amounts of metallic oxides. Prevention of oxidation during the sweating process, as ordinarily carried out, is hardly a practical proposition, since oxidation of metals always occurs when air is present. Due to this oxidation, much solder which otherwise would give metal ingot forms dross, which naturally is a less desirable product.

Carrying out the sweating process with the atmosphere excluded results in minimum formation of dross and maximum recovery of solder as ingot metal. A certain amount of dross is always present, as the radiators are never clean, containing sand, grease and other foreign materials. This dross has no value, since it does not contain any metal, while the dross which is formed as a result of oxidation of metals has a value which depends on its metallic content.

A process by which it would be possible to bring about

a perfect separation of solder from brass would, of course, be most desirable. As far as is known, such a process has not yet been developed on a practical scale and the only methods which are in use are sweating methods. Though these methods do not result in a complete separation, any improvement which gives better and more valuable products, is highly desirable.

Exclusion of Atmosphere

In order to exclude the atmosphere in the sweating process, paraffin was used in the experiments described below. Paraffin has a smelting point of about 100° F., a boiling point of around 800° F., and has no detrimental influence on metals. In contact with air, paraffin cannot be heated above a temperature of 465° F., without burning. In a closed vessel paraffin can be heated to its boiling point without burning. The sweating was carried out in a cast iron, open kettle at a temperature of around 500° F. At this temperature the paraffin burns and there is consequently a considerable loss. A lower temperature cannot be employed, since the solder will not melt off. The successful sweating of radiators under paraffin on a practical scale will therefore depend upon construction of an oven in which the sweating will take place in a chamber which can be kept closed at intervals.

Automobile radiators are either tubular or honeycombed. Ford radiators are tubular, and since the brass in the Ford radiators is of very thin gauge as compared with other tubular radiators, a special test was conducted using Ford radiators only.

Sweating of Ford Radiator Brass

Four radiators, having a weight of 77 lbs. 13 oz. (exclusive of iron) gave, after sweating under paraffin, the following products:

Brass ingot	62 lb. 14 oz.	80.8%
Solder ingot	3 lb. 14 oz.	5.0%
Metal contained in dross	1 lb. 1 oz.	1.4%
Loss	10 lb. 0 oz.	12.8%
		77 lb. 13 oz. 100.0%

The brass, after having been sweated, was, of course, not in ingot form, but was melted in a crucible and poured

into ingots. The loss given above consists, therefore, of the melting loss in making the brass ingots, as well as the loss due to dirt and foreign materials contained in the radiators.

Chemical analysis of the brass ingots showed the following composition:

Copper	76.8%
Lead	2.2%
Tin	1.8%
Zinc	Remainder

The dross had a weight of 1 lb., 12 oz., and its metallic yield was 1 lb., 1 oz., or 61.5%. The chemical analysis showed the following composition:

Copper	24.2%
Tin	23.6%
Antimony	0.9%
Iron	3.5%
Lead and Zinc	Remainder

The solder ingot had the following chemical composition:

Copper	0.74%
Tin	41.56%
Antimony	0.34%
Lead	Remainder

The total amount of solder in the Ford radiator was 9.1%; 55% of the total amount of solder—or 5.0% of the weight of the radiator—has consequently been recovered as solder, and the major part of the remaining 45% has fused to the brass and alloyed with it on subsequent melting down to ingot.

Sweating of Other Tubular Radiators

Four radiators, having a weight of 100 lbs., 5 oz., (exclusive of iron) gave, after sweating under paraffin and melting the sweated brass to ingots, the following products:

Brass ingot	84 lb. 2 oz.	83.8%
Solder ingot	6 lb. 3 oz.	6.2%
Metal contained in dross...	0 lb. 13 oz.	.8%
Loss	9 lb. 3 oz.	9.2%
	100 lb. 5 oz.	100.0%

Chemical analysis of the brass ingot showed the following composition:

Copper	79.3%
Lead	1.8%
Tin	1.9%
Zinc	Remainder

The dross had a weight of 1 lb., 8 oz., and its metallic yield was 13 oz., or 56%. Chemical analysis gave the following composition:

Copper	26.8%
Tin	22.3%
Antimony	0.9%
Iron	4.0%
Lead and Zinc	Remainder

The solder ingot had the following chemical composition:

Copper	1.0%
Tin	47.9%
Antimony	0.3%
Lead	Remainder

The total percentage of solder in the tubular radiators other than Ford's was 9.9%. Of the total amount of solder thus 63% have been recovered as solder ingot, while the major part of the remaining 37% has fused to the brass and alloyed with it on subsequent melting down to ingot.

Sweating of Honeycombed Radiators

Four radiators, having a total weight of 130 lbs. (exclusive of iron) gave after sweating under paraffin and melting the sweated brass to ingots, the following products:

Brass ingot	94 lb. 5 oz.	72.5%
Solder ingot	22 lb. 14 oz.	17.5%
Metal contained in dross...	1 lb. 1 oz.	0.9%
Loss	11 lb. 12 oz.	9.1%
	130 lb.	100.0%

Analysis of the brass ingot showed the following chemical composition:

Copper	78.2%
Lead	1.9%
Tin	2.1%
Zinc	Remainder

The dross had a weight of 2 lbs., 4 oz., and its metallic yield was 55%, or 1 lb., 1 oz. Chemical analysis gave the following composition:

Copper	24.8%
Tin	25.3%
Antimony	0.8%
Iron	3.4%
Lead and Zinc	Remainder

The solder ingot had the following chemical composition:

Copper	.74%
Tin	45.40%
Antimony	.56%
Lead	Remainder

The total percentage of solder of the honeycombed radiators was 20.7%. Thus, of the total amount of solder, 84% has been recovered as solder ingot while the major part of the remaining 16% has fused to the brass and alloyed with it on subsequent melting down to ingot.

Conclusion

There is a surprisingly small difference between the Ford and the other tubular radiators with regard to the solder contained and recovered. While 5.0% ingot solder was sweated from the Fords, 6.2% was sweated from the other tubular radiators. The main difference between the Ford and the other tubular radiators is the difference in thickness of the brass—the Fords being of much lighter gauge. As a result, the loss in treating the Ford radiators is greater—12.8% against 9.2% for the other tubular radiators.

The honeycombed radiators have considerably much more solder than the tubular. In the above test, 17.5% solder was recovered as ingot, or about three times the amount of recovered solder from tubular radiators.

The formation of dross is small when the radiators are sweated under paraffin cover. Less than one per cent of the total metal content is carried by the dross except for the Ford radiators, when 1.4% metal is contained in the dross.

It must be pointed out that the solder content of radiators varies not only in the various types, but also in different makes. Even radiators made by the same manufacturer have a varying solder content when they appear on the scrap metal market. This is due partly to repairs and re-soldering of leaky joints and partly to the manufacturers improving their methods of making the radiators. Though the results obtained in the experiments described above are characteristic for the different types of radiators, they cannot be said to represent the average of the different types, since this would require experiments with several hundred radiators of each type.

Ladle Linings for Brass Foundries

Experiments conducted by the Quigley Furnace Specialties Company, New York City, in the use of high temperature cements for ladle linings are reported by H. W. Slusser, foundry superintendent, as follows:

The company found a large number of cements to choose from and first made preliminary tests in a small way to determine their merit. The majority were discarded as not suitable for the purpose. The final test simmered down to three products on which actual practice tests were made in lining 300-lb. ladles used in the company's brass foundry, it is stated. The method of lining is shown in the diagram.

Standard type 300-lb. ladles were used. First a form was made for the ladle of a wooden frame covered with galvanized sheet iron having the proper taper from top to bottom and projecting about three inches above the top of the ladle. The top and bottom of the form was solid.

The bottom of the ladle was filled first with the refractory mixture to a depth of about 1 inch, then the form was placed on top of this and the refractory mixture rammed in between the form and the ladle with a flat metal tool. After the ramming-in was completed, the form was removed by tapping it and giving it a slight turn, at the same time drawing it upward.

This method of lining was tried out with three selected refractories which are designated as refractories A, X and Y. A careful record was kept of costs of each lining, the number of heats secured from each lining and the temperature drop in the metal while carrying the ladles from the melting furnace to the molds, a distance of about 200 feet. The results of these tests were as follows:

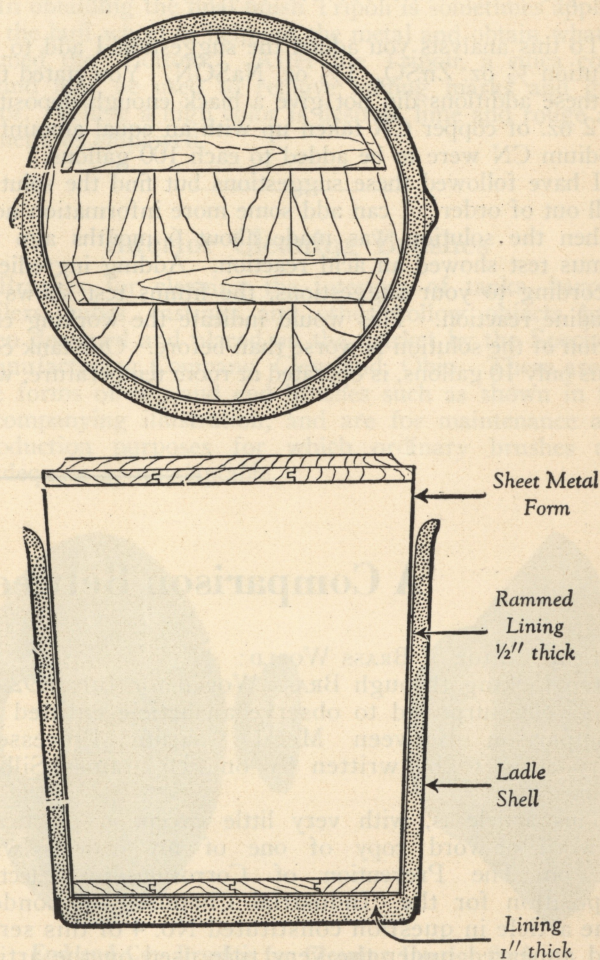
Costs and Service

	Cost Per Lining	No. of Heats	Temperature drop
Refractory X.....	\$1.40	20	150° F
Refractory Y.....	.82	35	100° F
Refractory A.....	.40	150 to 200	60° F

From the table it is evident that refractory A was far superior to the other two, being much lower in cost per lining, much higher in number of heats and again much lower in temperature drop, showing a combination of long service coupled with good insulating qualities and low cost.

The mixture used in refractory A was two-thirds crushed fire brick and one-third "Hytempite," manufactured by the Quigley company. In making this plastic mixture the cement was first diluted to a pancake batter

and then the crushed fire brick was added. The mixture was reduced to 1/16 mesh, including fines, very thoroughly mixed until it formed a mixture which, when squeezed in the hand, would show no free moisture, but would cling together. After withdrawing the mold, the finished lining was first dried out with a gas flame and then brushed over with a thin wash coat of "Hytempite" batter. As a result of these tests, the company has standardized on refractory A for ladle linings in its brass foundry.



Method of Lining Ladle

Specifications on Hose Couplings

Proposed new specifications on couplings for garden, water or wash-deck hose purchased by the United States Government have been issued by the Federal Specifications Board, Washington, D. C. These specifications are proposed for government use but may be adopted by others who find them useful, it is stated. Manufacturers and other interested parties are requested to criticize the proposed specifications, copies of which may be had by addressing the Board. Comments must be filed with the Board within six weeks after September 11, 1929, to receive consideration.

The proposed specifications cover two types of

coupling: slotted, expansion type, 1½ inch only; and lug or ribbed shank type. Composition is given as follows:

Copper, minimum	83%
Tin, minimum	5%
Zinc, maximum	7%
Lead, maximum	3%

Expansion rings are to be cut from seamless drawn brass tubing of certain specified composition. Plans and dimensions are drawn up in the proposal.

There is also a set of proposed specifications on four types of couplings for water suction hose.

Improving a Black Nickel Solution

To the Editor of BRASS WORLD:

The following analysis of my black nickel solution was made by you recently:

Metallic nickel	1.74 oz.
Chlorides	3.26 oz.
Sulphocyanide	.57 oz.
Metallic zinc	.13 oz.
pH	6.8

To this analysis you added the suggestion I add to the solution $\frac{1}{2}$ oz. ZnSO_4 , $1\frac{1}{2}$ oz. NaSCN . You stated that if these additions did not give a black enough deposit, 1 to 2 oz. of copper CN taken up with an equal amount of Sodium CN were to be added to each 100 gallons.

I have followed these suggestions but find the solution still out of order. I can add some more information now. When the solution was made about 6 months ago the litmus test showed an acid reaction. Adding ingredients according to your suggestions, the litmus test shows an alkaline reaction. This would indicate the working condition of the solution is worse than before. Our tank contains only 10 gallons, is operated at room temperature, with

0.6 to 1 volt. The additions you suggest always cause a white precipitate which seems to settle on the bottom of the tank. The reaction on litmus paper shows more and more alkaline. CuCN is not soluble in the solution and the white precipitate, to my experience, is CuCN or zinc.

New York City,
September, 1929

ERICH A. LACHE

The analysis of the sample black nickel as given to you on June 25th was correct.

The answer should have read, "add to the solution $\frac{1}{2}$ ounce zinc sulphate and $1\frac{1}{2}$ ounce sodium sulphocyanide to each gallon of solution" instead of "to solution." Make the further addition of these two chemicals as per gallon and results should be better. If not, we suggest that you make a new solution, since the volume of it is so small that the cost will be negligible.

Either make it from the prepared salts or from the following formula:

Double nickel salts	8 ozs.
Zinc sulphate	1 oz.
Sodium sulphocyanide	2 ozs.
Water	1 gallon

—OLIVER J. SIZELOVE

A Comparison Between Metal Coating Processes

To the Editor of BRASS WORLD:

On looking through BRASS WORLD for July, 1929, I was very surprised to observe an article entitled "A Comparison Between Metal Coating Processes," purporting to be written by one Dr. James Silberstein.

This article is, with very little exception practically a word-for-word copy of one of my articles written on The Prevention of Corrosion by Electrodeposition for the "Industrial Chemist" of London. The article in question constituted No. 4 of this series and appeared under the very title used on the article in BRASS WORLD, in the May, 1928, issue of the "Industrial Chemist."

I will reserve further comment pending your investigation into the matter.

London, England,
August 8, 1929.

S. WERNICK.

To the Editor of BRASS WORLD:

In reply to your letter of August 28th, in regard to the letter of August 8, 1929, from Mr. S. Wernick of London, England:

I find on investigation that I have among my notes copied the article of Mr. Wernick, unfortunately without giving the source.

In going over my notes with regard to metal coating processes I would, nevertheless, have suspected them of being copied, were it not for the fact, that about a year ago I made a survey of metal coating processes. My findings were practically the same as those published by Mr. Wernick, and this explains

the fact, that I, a year later, believed my notes to be original.

I regret very much this happening, for which I apologize to you and to Mr. Wernick.

Chicago, Ill.,
September 4, 1929.

JAMES SILBERSTEIN.

Lacquers of High Resistance

The General Electric Company, through its merchandising department at Bridgeport, Conn., has placed on the market a line of lacquers under the trade name "Glyptal" for which certain very desirable advantages are claimed.

It is stated that these lacquers will adhere to any surface, including galvanized iron and aluminum and that it will act as a sealing agent and protective as well as decorative coating. The makers state the lacquers were developed in the General Electric research laboratories and that they differ from commonly used paints and varnishes, being unusually resistant to mineral oils, gasoline, kerosene, weak acids and alkalis.

The lacquers are supplied in several colors, all having the same general properties of protection, decoration, adhesion, etc.

The new lacquers are stated to be applicable by spraying, brushing or dipping, the usual methods. They air-dry rapidly and smooth, flexible finishes of high dielectric strength are produced. Among its uses is stressed its efficacy as a sealing agent for oil, gas and water conveying equipment. The company offers test strips and information upon application to the Bridgeport offices.

Methods of Polishing Aluminum

PRACTICALLY all aluminum articles are polished and each type of article made of this soft, ductile metal presents a different polishing problem, according to A. Rousseau of The Norton Company, Worcester, Mass., writing in that company's publication, "Grits and Grinds." He says:

Aluminum products for ordinary use are made most generally by one of three processes: sand casting, die casting in moulds, or forming from sheets in power presses.

While the metal is easily cut, it is often necessary to remove sand or pit holes by the use of an abrasive. Each type of article must be considered separately to determine best polishing procedure.

It is a loss of time to use abrasive either too fine or too coarse for roughing, when a high finish is desired. Time gained in roughing, using coarse abrasives, will be lost on the following operations in removing the coarse roughing marks; too fine grain sizes reduce the rate of production and at the same time do not give a materially better final finish.

On heavy castings, where considerable metal is removed, the first roughing operation can be successfully done with No. 60 Alundum abrasive set up on a sewed buff, felt or canvas wheel.

The sewed buff is the more resilient and follows the shape of the work best, and should be used for round or formed work.

Sand cast pieces, with small pit holes and rough exteriors are most successfully roughed with a greased wheel of not coarser than No. 60 Alundum grain.

After roughing with No. 60 the next operation can be made with No. 90 or 100 depending upon the finish desired. There are some instances where an additional operation is necessary. In such cases wheels set up with No. 180 or No. 200 are used.

On die cast pieces which are fairly smooth from No. 90 to 150 or 180 Alundum abrasive can be used.

The polishing of sheets is readily done on a felt wheel set up with No. 180 Alundum and buffed with a felt wheel which gives a much better finish than a cotton buff. On sheets and flat work it is advisable to change the direction of the strokes when changing from one size to the next finer.

This will facilitate the obliteration of the scratches left by the coarser grain. Many sheets on which only the press marks must be removed can be polished directly with a buffing wheel using Tripoli for the polishing agent. No coarser abrasive is necessary in this instance.

On work that is painted instead of buffed, the uniformity of the grain is most important. This is especially true of work finished in lacquers of a light finish. Oversize grain will not break down but will leave its mark on the surface which is very easily distinguishable.

Successful finish or polish depends chiefly upon two points.

First, the care that is used in preparing the article for the final buffing and second, a plentiful supply of grease, tallow or some other lubricating agent used on the polishing wheels.

All roughing scratches must be removed in the fining operation. Work not properly finished on the fining wheel comes from the buff wheel with a high color but rough appearance. This is caused by the buff wheel dragging in the scratches and making them deeper.

The use of plenty of grease on all of the operations in the polishing of aluminum will mean a much better eventual finish.

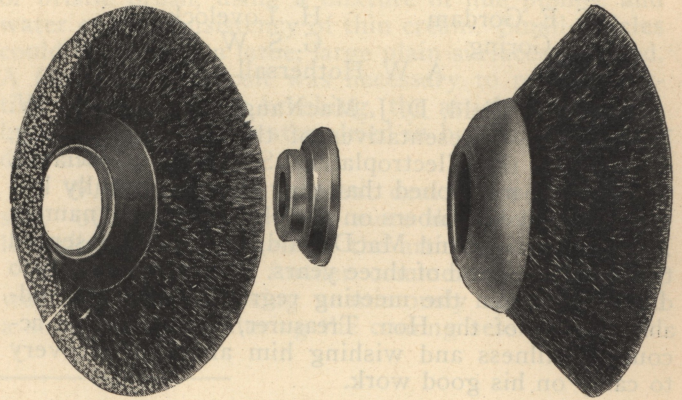
If a wheel becomes too dry it matters little what

size abrasive is used for it will imprint marks as deep as the amount of metal load on its face. Grease sticks sold by platers' supply houses, beef tallow, suet, kerosene, or an oil rag applied to the wheel reduces loading and dragging of the work and at the same time improves the quality of the finish for the final or buffing operation. If plenty of lubricant or grease is not used, the buffing operation is harder on the buffing wheel and there is a possibility of the buff dragging the pits and holes, making a poor finished casting.

In obtaining the final finish Tripoli is sometimes applied on the buff wheel to help cut the metal and obtain what is termed the "Bottom." After the Tripoli, a silica compound may be used to remove buffing marks and give color. Where a high color is desired, lime and rouge are sometimes employed.

Interior Cleaning Brushes

Brushes for cleaning the interiors of tanks, barrels, boilers, tubes, castings and other hollow objects have been designed and placed on the market by the Specialty Manufacturing Company, Cleveland, Ohio. These are in the forms of cup and end brushes such as shown in the accompanying illustration, and are for maintenance and production purposes for which ordinary brushes are inadequate or unadaptable.



End and Cup Brushes for Cleaning Interior Surfaces

The makers state that these brushes may be used either on a polishing spindle or in conjunction with flexible shaft equipment, and may be made up into gangs for any desired shape of brush surface. They are available in all regular sizes and also of any desired stiffness of wire or bristle.

The cup brush has bristles or wires locked between conical plates and is capable of cleaning in a forward direction as well as sideways, and can be inserted into pitchers, headed containers, tanks, etc., whose openings are smaller than the bottom to be cleaned. For corners and orifices so narrow that even the cup brush cannot do a good job, the end-brush is used. The use of the brushes is not confined to interior work. They can be used for exterior cleaning, but in such cases the ordinary type of "perfect balance" brush is generally preferable. Among the many uses suggested are the removal of scale and sand from cored castings, polishing of hollow-ware, garage work such as cleaning out cylinders and valve stem guide holes, preparing metal interior surfaces for welding, etc.

British Electroplaters' Society Meeting

Interesting Discussions Mark 1929 Sessions at
London—New Officers and Committee Elected

By OUR LONDON CORRESPONDENT

WRITTEN ESPECIALLY FOR THE BRASS WORLD

THE Electroplaters' and Depositors' Technical Society held the last meeting of the 1929 session at headquarters in London, when the annual election of officers and committee to serve in the next session, which opens in October, took place. There was an excellent attendance of members, and the president, S. Field, said that in retiring from office after three years service he was very pleased to welcome as their new president one who was well known and esteemed in the industry—their present vice-president, Dr. R. S. Hutton, director of the British Non-Ferrous Metals Research Association. As a result of the election the following constituted the new committee:

Officers

President, Dr. R. S. Hutton
Vice-president, D. J. MacNaughton
Hon. Secretary, S. Wernick
Hon. Treasurer, W. James

Committee

S. Field	F. L. James
G. E. Gordam	H. Lovelock
L. Goring	G. S. W. Marlow
A. W. Hothersall	

Messrs. S. Field, D. J. MacNaughton and G. S. W. Marlow are representatives of the Faraday Society, with which the Electroplaters' Society is associated.

Mr. Field mentioned that they were regretfully losing two active members on the old committee, namely Messrs. Perring and MacDonald, as they had served the limiting period of three years. A message was also dispatched from the meeting regretting the unavoidable absence of the Hon. Treasurer, W. James, on account of illness and wishing him an early recovery to carry on his good work.

Round Table Discussion

Subsequently, an open round table discussion was held in a number of queries put forward by members bearing on metal finishing in general and electroplating in particular, E. A. Ollard being in the chair. The first question to be discussed related to the special characteristics of nickel plating solutions used to deposit a subcoat of nickel before chromium plating.

S. E. Weill said nickel was preferable to copper as a subcoat to chromium and that good results were obtained with a solution containing about 3 pounds of single nickel salts, 4 ounces boric acid, 4 ounces sodium fluoride and $\frac{1}{4}$ ounce nickel chloride per gallon. The temperature of the solution should be about 100° F.

A. W. Hothersall said it was important to have a sufficiently thick coat of nickel or the chromium solution would strip the deposit when it was immersed.

G. E. Gordam said that according to a formula recently published by O. J. Sizelove in BRASS WORLD, New York, the quantity of single and double salts recommended was 4 ounces and 8 ounces respectively per gallon. A pH of 6 to 6.2, both temperature of 100 degrees F., and a current density of 20 amperes per square foot were the recommended conditions.

E. A. Ollard said that probably the manner in which the solution was worked was of greater importance than the ingredients in the solution. The treatment prior to plating was important: steel work should be given an anodic pickle and a bright dip was useful on brass work. As regards the solution, it should not be too acid and contain a little chloride while the anode side should be well packed.

J. W. Perring suggested a mixture of sulphuric and nitric acid could replace the anode pickle as the amount of etching could then be controlled, this treatment being useful on hard steels.

L. Davies said stresses to the deposit could be greatly reduced by the use of a warm solution. When the anodic pickle was used, articles should not be immersed longer than one minute.

Plating Aluminum with Nickel

A query was raised in regard to the deposition of nickel upon aluminum.

S. Wernick (Honorary Secretary) gave some details of a new process in use on the Continent, which was claimed to give efficient results, known as the Jirotko process. The important stage in the process consisted in the treatment prior to plating, and it consisted in simple immersion in solutions the ingredients of which depended on the particular composition and type of alloy being treated. It was stated the deposition of nickel or the application of enamels could then proceed with greater ease, and the adhesion and the protection of the coating were extremely good. The composition of the bath could be modified to give some beautiful color effects ranging from black and green bronze to gold. The coating was also claimed to form an efficient base for lacquers, enamels and paints which did not then chip or flake.

G. E. Gordam said the Aluminum Company of America had financed a research by H. K. Work aiming at a satisfactory method for depositing upon aluminum and its alloys. Three treatments were recommended for pure aluminum, cast alloys and worked alloys, respectively.

S. E. Weill said he had not found a chemical dip satisfactory as it quickly lost strength. Regeneration of the salt in some way was necessary. Aluminum could be colored practically any color or shade by means of aniline dyes after the article had been put through the anodic treatment.

G. E. Gordam said H. K. Work discarded the use of iron solutions as dips owing to their deterioration, but other dips tried out, e. g., one containing manganese salts, had given satisfactory results.

S. Wernick said that only a limited range of alloys could be satisfactorily treated by the anodic process. A dip process also had the advantage of giving no trouble in regard to throwing power although the anodic treatment was quite efficient in this respect.

E. A. Ollard said alloys containing zinc gave least trouble in plating and this was a point manufacturers might keep in mind, since no special treatment seemed necessary with zinc-aluminum alloys.

G. E. Gordam then gave interesting particulars of the working of the anodic process.

Formulae for Nickel Plating

E. A. Ollard said a question had been asked as to the composition of nickel plating solutions suitable for different kinds of plating. The discussion might be confined to types of bath suited for plating upon iron or steel, brass and zinc, etc.

A. W. Hothersall said the same solution could be satisfactorily used for brass and steel. Where a slow hard deposit of nickel was required, the double salt solution was best, while for rapid deposition, the single solution which should be heated and agitated gave best results. In depositing on zinc, the presence of a citrate and sodium sulphate had give satisfactory results.

S. E. Weill pointed out that a great deal depended on the skill of the plater. It was no use recommending a solution containing a high concentration of single nickel salts to an unskilled plater. In plating on zinc, a bath containing only a small quantity of nickel, say $\frac{1}{2}$ to $\frac{3}{4}$ pound per gallon, was best. The solution should be low in acid and "struck" at a fairly high voltage.

J. W. Perring said he used an ordinary nickel solution to plate die castings—this contained about the same amount of single and double salts and a little chloride.

It was suggested that a good plan was to copper the zinc surface first and strike the work at $2\frac{1}{2}$ volts. A suitable solution should contain 8 ounces double nickel salts, 4 ounces single nickel and 1 ounce common salt per gallon.

S. E. Weill was not in favor of coppering. It was difficult to cover the surface completely, while there was a possibility of electrochemical action between copper and zinc. A separate nickel solution should be used for zinc as non-zinc work plated later might be spoiled.

Summing up **E. A. Ollard** said there appeared to be three types of solution. In the first, the simple salt predominated; in the second, the double salt; and the third was a hybrid between the two. Most solutions fell into this class. In plating on zinc, sodium citrate could replace some of the nickel salt, the effect being to increase the cathode polarization.

J. W. Perring said that plated work coming from America often varied in quality but always appeared to possess a beautiful white color even in the recesses. A solution containing too much nickel was apt to produce a yellow tinge in the work.

A. W. Hothersall said that the solution which appeared to be used, judging from American literature, contained roughly 8 ounces double nickel salts, 12 ounces single salts, 2 ounces ammonium chloride also occasionally used.

A. Zimmerman said the ingredient which produced the white color was sal-ammoniac.

S. Wernick said German goods also often appeared to have a very good color. A lot depended on the acidity of the solution—a low pH favored a white deposit. Cadmium, which could be used as an anode or a salt, was a favorite brightener but required very careful control, otherwise deposits were not uniform.

The Satin Finish on Silver

Describing how this finish was obtained, **A. Ensor** said the article, after polishing and silver plating, and 2 ounces boric acid per gallon. Brighteners were was evenly brushed with a brass wire scratch-brush or bristle brush, using a mixture of fine pumice and water of the consistency of thin cream. Small articles could be done on a lathe, large plain surfaces by hand. A fairly thick deposit was necessary to prevent cutting through. After brushing, the article required to be washed in clean water, dried in hot boxwood sawdust and lacquered.

J. W. Perring said a great deal depended on the skill of the operator. The more skillful he was, the less silver was required on the article.

After one or two further comments, the meeting was concluded, it being unanimously agreed to hold a similar meeting during the coming session.

Course in Electroplating at City College

The course in practical electroplating at the College of the City of New York commences its second year on the evening of September 30th, under the personal direction of Dr. L. C. Pan. It is open to all persons interested in electroplating, metal finishing and chemical control of plating solutions. The class will meet on Mondays and Wednesdays from 7 p. m. to 11 p. m. in the Chemistry Building, Amsterdam Avenue at 138th Street, New York City.

The subject matter of the course will deal with the following topics:

1. Fundamental principles underlying the various operations of electroplating.

2. A critical study of each of the present processes and commercial practices of electrodeposition of various metals and alloys, including copper, nickel, chromium, silver, gold, cadmium, zinc, brass, iron, lead, tin and platinum.

Laboratory work constitutes an important part of the course. The exercises are mostly of deductive nature, thus bringing the student to a first-hand knowledge of the

principles involved. Among the exercises to be done in the laboratory are the Faraday's law, current efficiency, determination of thickness of deposit, electrode potentials, polarization and depolarizers, metal and metal-ion concentration, addition agents, brighteners, throwing power, porosity and corrosion tests, analysis of plating solutions. The laboratory work is arranged flexibly so as to meet the individual needs of each student.

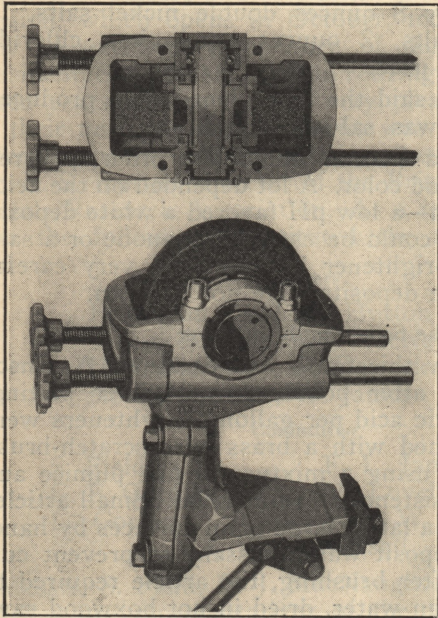
Registration for the fall term is now open. The class will be limited to a small number of students; preference will be given to those making early registration.

Correction—Chromium Raises Nickel

In the August issue of BRASS WORLD, under the title, "Chromium Raises Nickel Plate," there appeared in the first line of the answer to the question the statement: "The indications are that your chromium solution is too acid." This should have read: "nickel solution is too acid."

Grinding Wheel Dresser

A new type of dressing tool for cylindrical grinders has been developed and placed on the market by the Ross Manufacturing Company, Cleveland, Ohio. It is claimed for this device that its use makes for greatly increased life, higher accuracy in operation and other desirable features, among them marked reductions in wheel truing costs. A new departure in truing devices is said to be the hub design of the new tool which permits the inner instead of the outer races to revolve, in which detail it differs from usual ball-bearing types of dressers. This feature, it is claimed, will add greatly to the life of the



Emery Wheel
Truing
Tool

mechanism, due to a 40 per cent decrease in ball speed. Larger balls and "precision exact" machine tool bearings mounted in hardened and ground steel cages are said to give 60 per cent more load-carrying capacity. Bearings are of the closed type, avoiding initial loads and the necessity for adjustment by the operator. One bearing is fixed while the other floats, with the object of eliminating internal strains. The distance between bearing centers is doubled to reduce the leverage of thrust loads of the grinding wheel against that of the dresser, preventing "rocking" of the dresser wheel while in operation and assuring more accurate and uniform results. The hub axle is made in one piece to gain freedom from vibration and distortion under load.

Four washers, two of felt and two of specially treated cork, are employed to seal the bearings against grit and water. The edges of the grooved circumferences of the cork rings flex and form an air gap and water seal with the hub. Being lubricated with the bearings, the washers are said to outlast them.

A feature emphasized by the manufacturers is that dresser wheels may be replaced without disturbing the bearing assembly of the tool, since the wheel mounting and bearing assembly are integral. This is done quickly by removing four hollow head nuts that secure the two bearing caps. The tool has two adjustable steady-rests, giving three-point support and enabling tilting to any desired shearing angle. This takes most of the load from the dresser clamp and rigidly supports the dresser wheel close to the work. To gain light weight the holder and bracket of the tool are of Lynite, said to absorb vibration and to have greater tensile strength than cast iron.

Fuel for Melting Metals

A process for melting and refining of metals in a cupola furnace in direct contact with a special fixed carbon fuel has been developed by the Barret Company, 40 Rector Street, New York City. The process is said to have particular merit in melting and casting brass, bronze, high lead bearing alloys and copper. According to the announcement, 500 to 600 lbs. of metal is charged directly on top of the incandescent bed of fixed carbon fuel, and this charge is ready to tap into the pouring ladles in from 11 to 16 minutes.

The metal charges may consist of all chips (borings and turnings), all ingots, or mixed heats of chips, gates, scrap and ingots. Pouring temperatures are regulated by air control and depth of fuel bed, and metal pouring temperature of 2,500° F. can be secured without any trouble. The outstanding features claimed for this new process are:

Unusual and uniformly high grade of metal secured at the tap hole, thereby reducing the number of rejects in foundry and machine shop.

Extremely low total cost of melting per ton and of metal charges, due to high metal to fuel ratio.

High speed melting. High metal recovery.

Ability to use more foundry scrap, chips, etc., and less composition ingots, without in any way affecting the quality of the castings.

Low cost of furnace maintenance and up-keep.

Freedom in the foundry from heat, fumes, gases and noise. Extreme flexibility of process and furnace.

Simplicity of operation. Economy of floor space.

A number of highly successful installations have been made in some of the largest and most prominent foundries in the country.

This new process bids fair to revolutionize present melting methods in the non-ferrous metal industry.

This process and the fuel utilized in it are covered by patents and pending patent applications.

Metal for High Temperatures

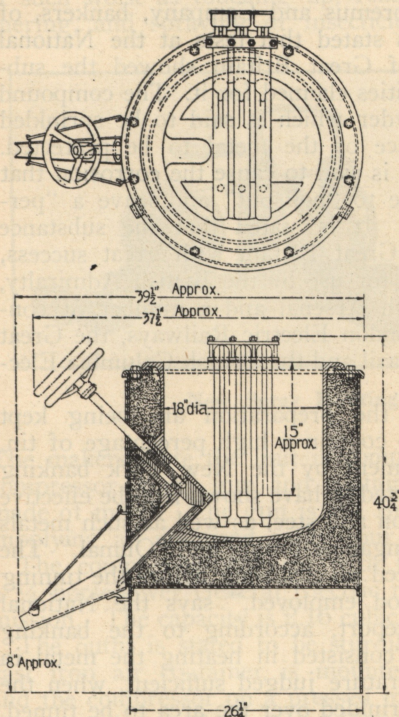
The Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa., announces the development of "Konel," a new metal for use in high temperatures. It is claimed for this metal that it will retain its strength at higher temperatures than other metals have been able to withstand without losing their strength. It will be useful extensively in the moving parts of internal combustion engines and other applications where metals must withstand heat and wear. Foreign patent rights have been obtained on this metal, it is stated. It was originally developed by the Westinghouse research laboratories as a substitute for platinum in the manufacture of filaments for radio tubes and was discovered to be harder to forge than steel and very tough at high temperatures, when most metals lose their strength. Engineers predict many uses for "Konel."

The new metal was created by Dr. E. F. Lowry, a graduate of Ohio State University. As a substitute of platinum, Westinghouse officials are authority for the statement that Konel already is saving approximately \$250,000 monthly in the manufacture of radio tubes.

Platinum costs approximately \$180 per ounce, while the new substance costs only a few dollars a pound. Life of Konel filaments is approximately ten times longer than other filaments. Tubes with filaments made of the new metal are operated 175 degrees colder than tubes with platinum filaments but with the same emission, thereby giving better reception results, research engineers say.

Bottom-Pouring Electric Melting Pot

A new type of melting pot for metals in which the chief distinguishing feature is a spout for bottom pouring has been placed on the market by the General Electric Company, Schenectady, N. Y., under the designation Type RP, a diagram of which is shown here. Where ladling is impractical or impossible and where large quantities of metal are handled, the pot is said to be of particular



Plan and Vertical
Section of Electric
Melting Pot with
Bottom Pouring
Spout

(Diagram, courtesy G.
E. Co. News Bureau)

benefit. Among the uses suggested for this type of pot are remelting and pigging of type metal, melting of Babbitt metal for bearings in railway and other shops, automotive factories, etc., and for other uses where its design makes it especially adaptable to manufacturing processes requiring melting apparatus for such metals and alloys as lead, tin, Babbitt, solder, type metal, etc., at temperatures not exceeding 950 degrees Fahrenheit.

Manual control of this apparatus is not recommended. An automatic control panel and a temperature control instrument are considered best for this type of melting pot. Its advantages, as stated by the manufacturers, are:

Heat is generated right in the metal, affording quick heating and low radiation loss. Heating units are easily replaceable without interrupting production. The maximum rate of heating is obtained without overheating. The pots are reliable, safe and economical.

Reducing Tri-Valent Chromium

Q.—How is a porous pot used to reduce the tri-valent chromium in a chromium plating solution? Where can the proper pot be procured?

A.—To reduce the tri-valent chromium in a chromium plating solution, make a chromium solution of 2 pounds of chromic acid to 1 gallon of water. Place in porous pot which is attached to the cathode rod with a piece of insulated wire and into the porous pot suspend a lead plate that is connected to the cathode rod. Work with highest current density possible.

Porous pots of any size may be purchased through the plater's supply houses advertising in BRASS WORLD. A convenient size is one 6 in. in diameter and 9 in. deep.

—OLIVER J. SIZELOVE

Electric Portable Drills

A complete line of portable and semi-portable electric drills has been designed and placed on the market by the Goodell-Pratt Company, Greenfield, Conn., well known manufacturers of hand and breast drills and other machinists' tools.

The new line is known as the Goodell-Pratt Super-Electric Drill and is among the first to appear with the chuck set on a line with the horizontal top of the drill, permitting close-up drilling against walls or under ceilings or other projections.

To further facilitate close-quarter drilling, a special, unusually compact ball-bearing chuck has been developed. While constructed for gear operation, the key is used only in emergencies or under unusual operating conditions, as tremendous gripping power is secured by hand-tightening alone, and it may be loosened with equal ease. The internal construction of the chuck is such that the jaws are self-tightening; the greater the torsional strain, exerted on them by the drill, the tighter they grip. By locating the gear ring at the rear of the chuck, many of the difficulties encountered in operation are eliminated. Ball breakage is eliminated by dispensing with ball bearings except in the thrust, long sleeve bearings of high-speed bearing metal, perfectly aligned, being found more efficient and lasting for the high speeds at which the armatures turn.

A capacious and efficient wick-oiling system tightly sealed against leakage provides lubrication for the armature shaft bearings. The spindle bearings as well as the gear bearings are all double end line reamed after assembly to secure perfect alignment. All gear bearings are of the best bearing bronze and are thoroughly lubricated by grease from the grease tight gear case.

A fan of sufficient capacity to keep frame and handle comfortably cool and still maintain the efficiency of the motor at its height, is mounted in perfect balance on the armature shaft in a separate chamber located between the armature and the gear case. The air is drawn through holes in the end handle cap impinging directly on brushes and commutator and passing between the armature and field on through the fan and expelled through holes in the periphery of the frame. The location of the intake holes practically eliminates the possibility of dirt and dust being drawn in when the drill is laid down with the motor running.

The special, non-kinking flexible cable is highly acid and oil resistant and is fastened to the body of the drill with a patented three-jaw lock, making it impossible to pull or jerk the cable out, and relieving the strain on the terminals.

Goodell-Pratt super-electric drills are now being made in $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$ and $\frac{3}{8}$ in., heavy duty, $\frac{1}{2}$ in., light duty, $\frac{1}{2}$ in., and $\frac{9}{16}$ in., standard, $\frac{1}{2}$ in., and $\frac{5}{8}$ in., heavy duty and $\frac{7}{8}$ in., standard. Drill stands, bench clamps and special arbors for holding grinding wheels, scratch brushes, etc., are also furnished. These are fully described in a new electric drill catalog recently from the press, copies of which can be obtained by addressing the manufacturers at Greenfield, Mass.

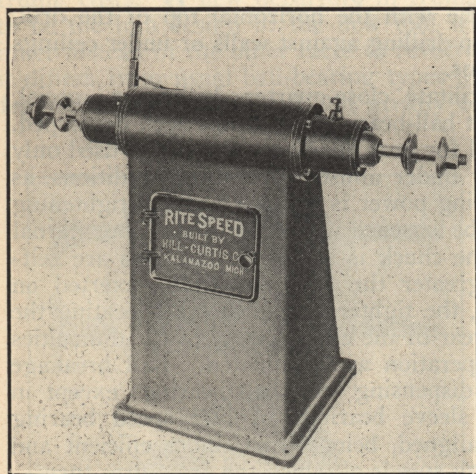
List of Alloys

The American Society for Testing Materials, Philadelphia, Pa., publishers of "A List of Alloys," well known and widely used pamphlet, advise that the list is now out of print and is undergoing revision upon completion of which a new edition will be printed. According to J. K. Rittenhouse, assistant treasurer, it will be at least a year before the new edition is ready.

Polishing and Buffing Lathe

Hammon Machinery Builders, Inc., formerly Hill-Curtis Company, Kalamazoo, Mich., announces the addition of a new polishing and buffing machine to its line of "Rite-Speed" grinding and polishing equipment. One of the new type lathes is shown in the illustration.

The makers state that the new lathes are furnished



New Type
Polishing
and Buffing
Lathe

either as here shown or with the overhanging spindle arrangement. The incorporation in this machine of the multi-V type of belt in an easily removable form is featured. The belt, which furnishes power to the spindles, can be taken out by removing four cap screws on each side of the spindle. The belt comes out of the pedestal without necessity of disturbing the bearing mounting, but by loosening the motor adjustment to release the tension. It is stated that in other respects as well the machine has been constructed to permit continuous service, ease of control and simplicity of operation with minimum attention.

The machine is furnished with combination switch and brake, a new feature on all Hill-Curtis polishing machines. By pulling the lever forward the current is cut off and the brake applied; reversing this operation starts the machine. Adjustment of belt such as tightening is done from outside without disturbing motor mounting. Motor is mounted in the pedestal. Timken tapered roller bearings or ball bearings are supplied according to specification. Automatic motor starter with overload protection is standard equipment.

New Type Electric Cable for Plants

The General Electric Company, Schenectady, N. Y., announces a new type of armored cable for industrial, central station and other interior wiring, which can be used without conduit. The cable is of the interlocked, flexible, metal-armored type, which can be run along walls, between partitions and under floors without use of ducts, its construction allowing for bends and turns. Varnished cambric and rubber-insulated, either taped, braided or leaded, and paper-leaded cable with the armor can be supplied in lengths up to 1,000 feet for cables with an overall diameter less than one inch, and in lengths up to 2,000 feet for cables with an overall diameter between one and three inches. The cables can have any number and combination of conductors, and any outside diameter up to three inches.

The armor is a layer of overlapping and interlocking metal tape, either galvanized steel or aluminum, so applied that the cable is always mechanically protected under reasonable installation conditions. The steel armor is suitable for most installations; the aluminum tape is for

use where a non-corroding armor is required and for single conductor cable carrying alternating current where the magnetic effect of steel is undesirable.

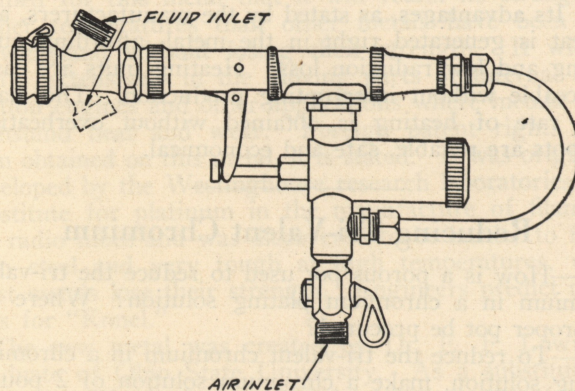
Tin Rustproofing Compound

Development by a Canadian scientist of a tin compound which has remarkable properties of providing a corrosion-proof finish for such metals as cast iron, steel, bronze, etc., is reported by Doremus and Company, bankers, of New York City. It is stated that tests at the National Physical Laboratory of Great Britain showed the substance to have the qualities claimed for it. The compound is a greyish white powder which is said to be sprinkled on the corroded surface of the metal to be protected. Under heat the powder is said to cause the corrosion that has already taken place to "boil out" and leave a "perfectly tinned" surface. It is stated that the substance has been marketed in Great Britain with great success, it having been adopted for use by the British Admiralty, Air Ministry, Woolwich Arsenal and a number of concerns, including the London Electric Railways, the Great Western Railway of Brazil and the British Columbia Electric Railway Company.

The ingredients of the preparation are being kept secret. It is known to contain a high percentage of tin, according to the statement by the New York banking firm, and tests are reported to have shown it to be effective in tinning rusty cast iron and steel as well as such metals as phosphor-bronze, manganese-bronze and "Ohmal." The metals, it is claimed, need no cleansing before the tinning operation. "The method employed," says the National Physical Laboratory report, according to the banking firm's announcement, "consisted in heating the metal in a gas flame to a temperature judged sufficient, when the preparation of tin is sprinkled over the area to be tinned. The powder evolved fumes, appeared to melt and rapidly produced a continuous 'tinned' surface." The names of the inventor or distributing agency are not given.

Multiple Airbrushing Unit

The Paasche Airbrush Company, Chicago, Ill., has designed and placed on the market a new type of automatic airbrushing apparatus by means of which one operator can apply coatings with a battery of up to fifty nozzles. The mechanism, shown in the illustration, can be operated



Automatic Airbrush Control Unit

a single spraying unit also, and the following advantages are claimed for it by the makers:

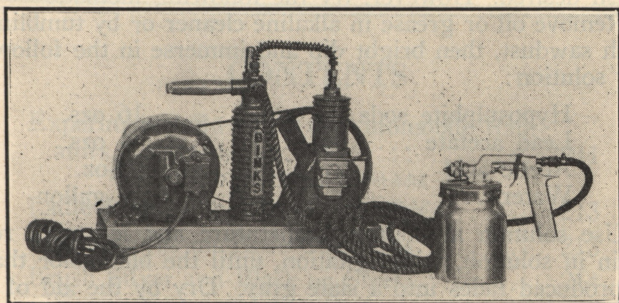
Complete enclosure of all parts, preventing clogging and eliminating wear.

Features of time and labor saving due to automatic operation by one person of a battery of spraying heads.

Adaptability to all types of coating materials, ranging from lightest stains to heavy plastic compounds.

Unit Spraying Outfit

A new type of all-purpose paint spraying outfit has been placed on the market by the Binks Manufacturing Company, 3114 Carroll Ave., Chicago, Ill. The unit, shown in the illustration, is known as the Binks New Hurley Unit, and is being manufactured on large scale production basis. It is designed for general utility in such work as touching up, refinishing, painting, lacquering, and spraying of insecticides and disinfectants.



New Spray Painting Unit

The makers state the unit is complete, consisting of air compressor, spray gun and container of full quart size, made of metal. The gun is the Binks pressure cup type supplying an atomized spray four inches wide.

The compressor supplied with the unit is driven by a $\frac{1}{4}$ horsepower General Electric motor, with belt transmission. The capacity is 2.16 cubic feet of air per minute.

The outfit is stated to be sturdily constructed. A rib cast iron air container is mounted between the motor and the compressor on a pressed metal base, all of which is mounted on rubber feet. The cylinder and base are cast in block of seasoned gray iron and accurately machined. Ten feet of rubber-covered electric cord, attachment plug, and ten feet of durable braided rubber air hose are attached to the outfit.

The new Hurley unit is complete ready for use upon delivery. The inexperienced or experienced operator merely plugs the electrical connection into a nearby light socket, places the material into a quart pressure container, and starts to work, according to the manufacturer's announcement.

Aluminum Hardening and Surfacing Method

Engineers of the Perma-Chrome Process Corporation, Cleveland, Ohio, have developed a method for hardening and surfacing aluminum to prevent the possibility of easily scratching the metal and also to eliminating its tarnishing and its tendency to smudge other objects coming in contact with it, it is announced. The process is also said to make the metal resistant to the effects of salt water, various acids and other corrosive agents which injure untreated aluminum. Besides this, new possibilities of coloring the surface of aluminum are claimed for the process, which is said to produce delicate color effects as well as protection.

Manufacturers of light aluminum stampings are said to be particularly interested in the process due to claims of speed, economy and effectiveness made for it. The company states that in its effect it may be compared to the cyanide process of hardening the surface of steel. Every item treated is completely submerged and the effects equally imparted to every part of the metal. Another advantage claimed is that aluminum's inherent advantages of ductility and flexibility in forming, shaping, stamping or spinning are preserved and the new hardening and

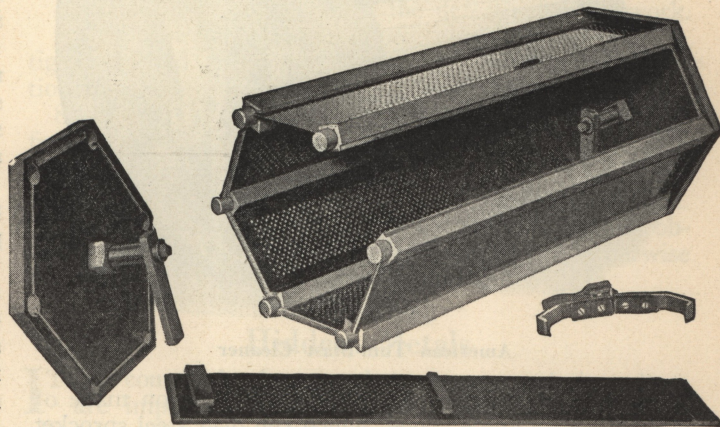
finishing process applied as a last stage in manufacture. Scleroscopic tests in the laboratory of one big concern showed an increase in hardness of over 100 per cent. The scleroscope reading for standard aluminum being 7 points—the reading for same sheet after treatment being 16 points.

This method of treatment comes as a result of research conducted by Harry F. Gardner, formerly of the United States Bureau of Standards, in the interest of a new aluminum ice cream freezer now being marketed by the Electric Refrigeration Division of the General Electric Company. One of the first results of the discovery was an order to treat ten thousand aluminum cafeteria trays. The object sought here was the elimination of smudge, that lead-pencil-like contribution of aluminum ware which frequently decorates the hands and faces of cafeteria patrons. A second motive was to secure the attractive new finish with smooth, hard surface, not easily scratched, that characterizes products treated by the new process, for which no name has yet been coined.

Tested for 338 hours in a twenty per cent salt solution, metal treated by the process is said to show absolutely no effects. Subjected to hydrochloric acid, the process showed, under time test, twenty times the resistance of aluminum or aluminum alloys. Tests conducted in connection with cooking utensils such as toasters, waffle irons, coffee urns, lemon squeezers, ice cube containers for electric refrigerators and similar items, show an entire absence of tarnish even under sustained exposure of heat or cold. Fried eggs no longer stuck to an aluminum spider, treated by the process; potatoes boiled in an aluminum vessel failed to discolor the aluminum at the point of evaporation as before.

Non-Treeing Plating Barrel

The Crown Rheostat and Supply Company, Chicago, Ill., announces the development of a new type of barrel plating machine in which treeing (the growth and spread of the metal electric contacts) has been entirely eliminated. The machine, the barrel of which is shown in the illustration, is stated to be the result of an intensive



New Type of Barrel Plater

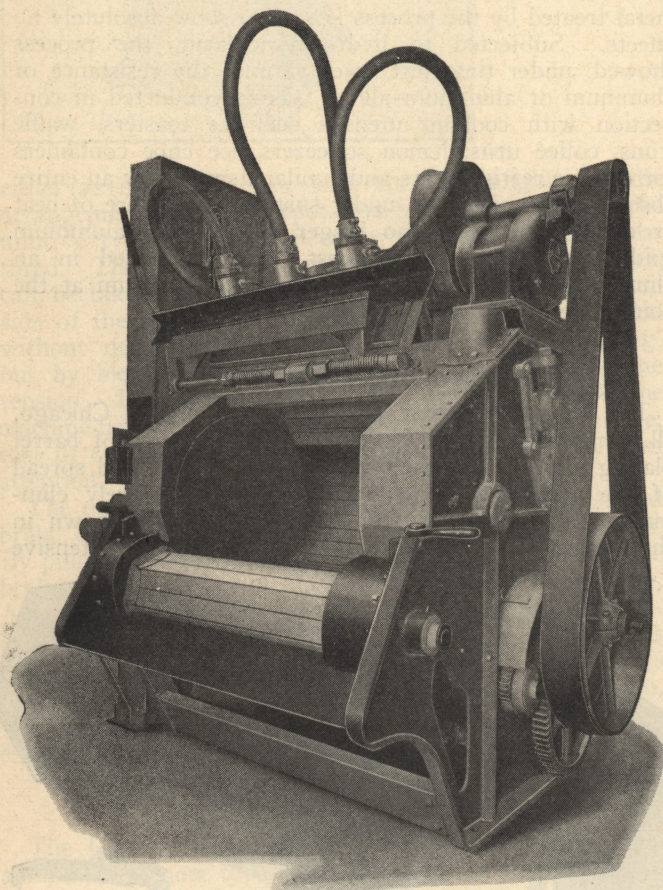
study of the treeing evil which has been a source of annoyance to plating barrel users. The company states it was found that in cylinders of ordinary construction treeing was inevitable, due to the mode of assembly, so that a new method of making the barrels had to be adopted. In the new type of cylinder the bolt-heads and nuts which cause treeing were eliminated by the use of what the company terms the "drive-fit dowelled and grooved assembly" of heavy, one-piece heads. These heads are made of bakelite and it is claimed they are tree-proof.

It is stated that the entire construction is heavier, and

the all-bakelite feature provides strength, insulation and resistance to corrosive attack. Another feature is the absence of center rod through the cylinder. The cylinder is supported by the heads, into which the side panels are grooved and dowelled. Elimination of the center rod is stated to facilitate loading and unloading, and to eliminate some of the possibility of damaging plated articles. The time-saving factor is also stressed. Greater ability to keep plating processes under scientific control is also stated to be possible with the new device.

Tumbler for Sand Blasting

Designed on principles said to be a distinctly new departure in sand blasting methods, The American Foundry Equipment Company, Mishawaka, Ind., has placed on the market an equipment for cleaning castings and other products by means of sand under high pressure which is applied while the objects being cleaned are moving in a tumbler. The machine, called the "American Tum-Blast Cleaner," is of the barrel type, although the usual barrel



American Tum-Blast Cleaner

has been supplanted by a housed endless apron made of 34 double steel angle staves, which run over steel sprocket wheels that are motivated by link chains.

The apron holds the load and revolves it while the sand blasting is applied through three stationary pressure type nozzles which pour a continuous curtain of sand over the entire width of the apron. The nozzles are fitted to the door, which raises to permit loading. Unloading is accomplished by reversing the apron, making for speed and labor-saving. Steel shot, grit or sand can be used as abrasive material. The four chief features claimed for the apparatus are type and location of nozzles (see illustration), manner of tumbling load with door open for inspection, ready means of loading and unloading, extreme efficiency of operation.

Dark Gun Metal on Brass

Q.—Can you give us a suitable formula for producing on high or low thin sheet brass a gun metal finish of a very dark slate color. This work would have to be done on small sheet metal caps in quantities of perhaps 100,000 per day. We think that possibly a flat finish would be preferable to one with much lustre. We would also like to know whether such a finish would require lacquering.

A.—It would have been easier to give you a method of finishing your product if you had sent sample of the finish desired. However, try the following method:

Remove oil or grease in alkaline cleaner or by tumbling with sawdust, then bright dip and immerse in the following solution:

Hyposulphite soda	16 ozs.
Lead acetate	4 ozs.
Acetic acid	½ oz.
Water	1 gallon

Use solution at boiling temperature and let work remain in solution, with agitation, until the blue color that is produced fades into a slate gray. Dry by the aid of a soap water solution, hot water and sawdust if you have no centrifugal dryer.

It will be necessary to lacquer the article to preserve the finish. The work can be handled through the bright dip and the oxidizing solution in the same container providing nichrome dipping baskets are used.

If results are not satisfactory, send sample of finish desired.

—OLIVER J. SIZELOVE

Defective Nickel Solutions

To the Editor of BRASS WORLD:

The August issue contained a letter on page 187 referring to a problem the writer answered. This inquirer stated that my analysis of his nickel solution gave the ingredients as 1.86 oz. metallic nickel, chloride as ammonia chloride, 2.27 oz. and the pH as 6.8. To this he took exception, stating that the solution sent me contained nickel chloride, zinc sulphate, ammonia sulphocyanide, ammonia chloride and copper sulphate.

The inquirer sent me a black nickel solution and a white nickel solution at the time. In some way he has the analysis of one as that for the other and vice versa, as can be seen by referring to page 120 of the May issue, where the answer was published.

He apparently questions the analyses made, as well as asking the meaning of pH and also whether copper sulphate is added to a copper solution in crystal form.

In making an analysis of the different plating solutions, the constituents are calculated and expressed in terms of ounces per gallon of the metal and not by the salt that is used in making the solution, for without any information of the original formula the results might be misleading.

After the metal content has been determined, it may be readily converted to the salt of the metal by simple calculation, as, for instance, in the case of your white nickel analysis with a metal content of 1.86 ozs. of metallic nickel. It could be expressed in terms of 8.9 ozs. of single salts or 12.4 ozs. of double nickel salts per gallon of solution.

pH is a symbol used to express the degree of acidity of a solution. It is more accurate to get the pH than to rely on the older method, that of using litmus paper.

In reference to the formula for acid copper solution, copper sulphate 28 ozs. per gallon is the crystal copper sulphate of commerce.

—OLIVER J. SIZELOVE

BRASS WORLD

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BRASS WORLD is regularly indexed in the Industrial Arts Index.

Chromium in the Home

WE think of inventions as being of benefit to "man-kind," but more often to man rather than woman. In the metal industries, particularly, most of the work is done by and for men. It is interesting to discover, therefore, that one of the most important improvements in the plating industry, namely chromium plating, is also of great value to women.

The use of chromium plated hardware fixtures and tableware will release women from a considerable amount of polishing of door knobs, knives, forks and spoons. Mirrors made of chromium plated metal should not grow dull; candlesticks and other metal ware, always a trial to keep clean, need no longer be feared.

Just as industry utilizes inventions to save labor, so can the home use inventions to release its caretakers from useless drudgery.

Shop Problem Data

WE ask of our readers who are writing for information and assistance on shop problems that they observe the following suggestions:

1. Give the original formula used for the solution.
2. Describe the trouble clearly.
3. Give the temperature at which the bath is operated; also voltage and amperage used.
4. State the kind of anodes used.
5. Give volume of solution (capacity of tank in gallons).
6. Send a small sample of the defective plated work.
7. Send a two or three ounce sample of the solution, tightly corked and carefully packed. If chromium solution is sent, use a rubber or glass stopper.
8. If a certain finish is desired, send a sample of such finished work, as there are some finishes which have several names.
9. State the composition of the base metal to be plated.

By following the above suggestions, inquirers will obtain much more complete answers than it is otherwise possible to give them.

Hidden Metals

IT is commonly known that copper and its alloys are important in modern ship construction. Most of us are not aware, however, of the fact that as much as 10 per cent of the weight of a ship may be of copper, half of it being in the electrical equipment and wire requirements according to a recent bulletin of the Copper and Brass Research Association.

Metals appear in a wide variety of places where they are hard to find. For instance, every automobile tire contains about a pound of zinc oxide. Mercury appears in everything, from pharmaceuticals to boilers. Cadmium roves from a fusible plug to undercoatings for plated steel.

The market for metals is wider today than ever before, and their uses are rapidly increasing.

Questions and Answers

All inquiries are answered in the order received and, whenever possible, the answers published in the next regular issue

Acid Addition for Nickel Bath

Q.—Some time ago the following formula was published in BRASS WORLD:

Double nickel salts 10 oz.
Sodium chloride 7 oz.
Boric acid 1 oz.

I am using this solution and I would like you to answer the following question about it:

What is the best acid to add to this solution to reduce the pH when it gets above 6 and what would be the cause of this solution's not throwing into the recesses of the work after it is operated for a while?

A.—Keep the pH of your solution between 5.6 and 5.8. Do this only with boric acid; none other. If your solution does not throw into recesses and you are sure that it is not due to insufficient anodes or poor rack construction, add 4 ounces of sodium sulphate to your bath. That will surely improve the throwing power. But be positive that you cannot apply other remedies first, as, for example, if you are wiring your die castings, you may have them crowded too close together.

—JOSEPH HAAS.

Cadmium Cyanide

Q.—We refer to the article in your July, 1929, issue, page 176, entitled "Blue White Finish."

In this article you suggest a solution requiring, among other ingredients, cadmium cyanide. From what we can find, this chemical is not available in the United States in a commercial way. Are you in a position to tell us where same may be procured?

A.—If you cannot obtain cadmium cyanide, substitute in the formula for the 5 ounces cadmium cyanide $4\frac{1}{2}$ ounces cadmium oxide. The results from the solution mentioned will be the same.

—JOSEPH HAAS.

Chromic Acid in Copper Bath

Q.—Our copper solution has suddenly gone dead. We have tried every means known to us without success. It simply will not plate. We have had the solution analyzed and have governed ourselves accordingly, but to no effect.

The copper tank is on one floor just under a chromium tank and we have discovered a leak in the heating pipe in both tanks. We have thus come to the conclusion that some of the chromium solution, by suction or otherwise, has gotten into the copper.

Will you kindly let us know of a means of counteraction in such an emergency.

A.—If there has been any great amount of chromic acid introduced into the copper solution, it undoubtedly would cause trouble. We would suggest that you take a

small volume of solution (say 5 gallons) from the tank and experiment with this by making small additions of sodium cyanide and trying after each addition to see if the solution will give a deposit of copper.

We would have been able to give you a more definite answer to your question if you had sent a sample of the solution along with the question.

—OLIVER J. SIZELOVE

Cleaning and Lacquering Castings

Q.—If you can supply them, we would also like you to send us a formula for each of the following processes:

Cleaning and coloring brass and bronze castings by cold dipping—to produce yellow to orange color.

Lacquering brass and bronze castings by dipping process. We want a commercially practical dip to produce a yellow to orange finish.

A.—Brass and bronze castings are placed in baskets and soaked in a pickle of 10% sulphuric acid and 2% hydrofluoric acid. The temperature of this bath is kept at about 120° F. This loosens the sand and scale. Then, after rinsing in water, the castings are dipped in a burn-off bath which is merely nitric acid, then rinsed in water and dipped in a mixture of sulphuric acid 4 parts, nitric acid 3 parts. This mixture is called a bright dip. Next rinse in water, which should be followed by a second rinse in very clear cold water and then a rinse in hot water.

The pickle bath is usually and most practically contained in a lead-lined tank equipped with an exhaust hood. The nitric acid and bright dips are contained in stone jars standing in cold running water.

For lacquering write to the advertisers in BRASS WORLD. Any of them will sell you lacquer suited to your purpose and show you how to use it.

—JOSEPH HAAS.

Chromium for Stove Work

Q.—I am looking for information on chromium plating. I am a manufacturer of stoves and ranges. I will appreciate anything that you can advise me on the following:

1. Has chromium plating been adopted by the stove and range industry?

2. If not, is there anything inherent in chromium plating that makes it unsuited to use on stoves and ranges that are now nickeled?

3. If suited to stoves and ranges, is it necessary to have any additional equipment where a nickel plating department is already established, other than the chromium tank, solution and anodes?

4. Can an ordinarily good nickel plater be quickly trained to successfully apply chromium plating? Are there people available to teach the application of chromium plating?

5. Can you give me an idea of the total additional

investment necessary for a plant using 2 nickel plating tanks about 8 feet long?

A.—1. and 2. While chromium has not been used to any great extent by stove manufacturers in the past, it is bound to be used in the future. What would be a more pleasing effect on an enameled stove or range than to have the plated parts finished in chromium, when there would be no tarnishing effect as is the case with nickel?

3. Besides chromium tank, solution and anodes it will be necessary to have an exhaust system for the chromium tank and also a generator of sufficient size to provide proper amperage to do successful chromium plating.

4. There are several factors that have a marked effect on chromium plating, namely temperature, current density, concentration of the bath and control of the sulphate content. Any good plater should have no trouble in controlling these.

5. The probable cost of installing additional equipment, outside of the generator, for a 200-gallon solution, would be around \$1,000.

—OLIVER J. SIZELOVE.

Cobalt Plating

Q.—I have heard a little about plating with cobalt and wonder if you can supply me with any information on this subject, or direct me to a source of such information?

A.—Formula for cobalt solution:

Double sulphate of cobalt and ammonium 6 ozs.
Boric acid 1 oz.
Water 1 gal.

Current density, 10 amperes per square foot at $1\frac{1}{2}$ to 2 volts.

For further data, refer to paper by Kalmus, Harper and Savell, read at the 27th meeting of the American Electro-chemical Society at Atlantic City, N. J., April 22 to 24, 1915.

—OLIVER J. SIZELOVE.

Dissolving Gold in Porous Cup

Q.—We would like to have you outline the correct method of running a green gold anode into solution by the porous cup method. We also wish to know the general procedure in producing a green gold finish on jewelry boxes made of brass.

A.—The method of preparing a green gold solution from the anode consists of making a solution of 4 ozs. sodium cyanide to 1 gallon water. Fill tank to proper level with this solution and connect tank in the usual way for plating. Hang the green gold anodes on anode rod, and on cathode rod suspend a porous pot filled with a solution that is made of 4 ozs. sodium cyanide, 1 gallon water.

The solution level of the tank and the porous pot should be the same. Into the porous pot place a carbon anode with connection made on cathode rod. Use 6 volts; temperature, 95° to 100° F. The amount of gold that goes into solution may be determined by weighing the anodes at stated intervals. Use 18 karat green gold anodes.

The following formula will also give good results.

Metallic gold reduced to fulminate 4 dwt.
Silver chloride 1 pwt.
Sodium cyanide 2 ozs.
Water 1 gallon

Temperature 95° F.; $1\frac{1}{2}$ to 2 volts; 16 karat green gold anodes.

Care should be used in cleaning the work so as to avoid any tarnish or stains. A deposit of 5 minutes is considered fair for your class of work. After plating, the work is

dried and then lightly colored on a very soft muslin or cotton flannel wheel, using lamp black and kerosene as the polishing medium.

—OLIVER J. SIZELOVE

Finishing Medals

Q.—We are sending you a medal which we would like to have you look over and let us know if possible how this finish is put on the metal.

If you can give us a formula for making a solution for getting that color of plate we will appreciate it.

A.—Sample medal has been finished in the following way:

The base metal is copper. After blanking and stamping operations the metal is freed from oil or grease in an alkaline cleaner and then bright dipped. Work is then sand-blasted, which produces the matt or dull appearance. After this operation, it is cleaned again in an alkaline cleaner to remove finger marks, and plated in the following solution:

Caustic soda 4 oz.
Sodium cyanide 4 oz.
Arsenous acid 2 oz.
Antimony sulphide $\frac{1}{2}$ oz.
Water 1 gallon

Use solution at 80° F., with steel anodes, at $2\frac{1}{2}$ to 3 volts.

This solution plates very fast, so it requires only 2 or 3 minutes until the smut is produced. Relieve the high lights with bicarbonate of soda moistened with water, on a soft rag wheel. The edges and back have been scratch brushed wet on a nickel silver crimped wire scratch brush wheel. The work is dried and lacquered, finally.

—OLIVER J. SIZELOVE

Finishing Pewter

Q.—I have been called upon to finish some pewter and I do not know how this is done. Can you give me any information on the subject? Have you a book that covers all finishes for metals?

A.—We do not understand from the question exactly what you have in mind, whether you are to produce a pewter finish or to plate on pewter. If you wish to produce a pewter solution, make up the following:

(1) Water 1 gallon
Stannous chloride 2 oz.
Rochelle salts 1 oz.
Sodium hydroxide $2\frac{1}{2}$ oz.
(2) Water 1 gallon
Lead acetate $\frac{1}{2}$ oz.
Sodium hydroxide 3 oz.

Mix the two solutions together and operate at $1\frac{1}{2}$ to 2 volts. Use ordinary solder for anodes. To darken the deposit to give it the appearance of old pewter, brush over with the following solution, using a painter's sash brush.

Water 1 gallon
Copper acetate 1 ounce
Ammonium chloride $\frac{1}{2}$ ounce

Wipe off with a cloth thoroughly and then lacquer.

If you have in mind plating upon pewter, plate it as you would iron or steel in a cyanide copper solution. Note the following exception: have your pewter articles free of buffing dirt before immersing in regular alkali cleaning solution. This may be done by several methods, depending upon how you are equipped: (1) cleaning in gasoline; (2) soak in alkali solution and then scratch brush; or (3)

by using as soaking solutions various prepared cleaners that claim to remove buffing dirt without attacking and discoloring the pewter. After copper plating, any of the other standard metals can be deposited.

—JOSEPH HAAS.

Peeling Nickel Plate

Q.—We plate auto radiator shells, head lamps, tie rods and practically all other plated parts for automobiles. For the past year and one-half we have had no trouble with our plating, but now we are finding articles with peeled spots in the plate. The nickel peels off in spots of pinhead size and a little larger. On some things there will be only one or two spots, on some there are up to a dozen places where the nickel has come off. It is mostly on the tie rods and shells that peeling occurs, and it is largely on the faces of the shells. This is the largest part of the polished surface, of course. On some shells which at first show only one or two peeled spots there appears after a while a little crack here and there and in these places the nickel can easily be peeled off with the finger.

The shells are first polished and brushed to a good finish, copper plated 22 minutes in this solution: sodium cyanide, $3\frac{3}{4}$ oz.; copper cyanide, 3 oz.; caustic soda, about $1\frac{1}{2}$ oz.; water, 1 gal.; temperature, 125° F. The copper plate has given no trouble. The shells are scrubbed clean after soaking and then cleaned in reverse current at 6 volts, after which they are copper plated. Then they are buffed and then again soaked in cleaner and scrubbed. Then they are struck with 6 volt reverse current, rinsed in cold water, hung in cyanide (10 oz. per gallon) one minute at 80° F.

The nickel solutions are in three 300 gallon tanks. The solution consists of nickel sulphate, 30 oz.; sodium chloride, 4 oz.; boric acid, 3 oz.; Epsom salts, 5 oz.; temperature is kept at 100° F. We plate 16 shells in a tank; each shell has $5\frac{1}{2}$ sq. ft. of surface. We allow 1,100 amperes to a tank and keep the pH at 6.0. This has been our practice for a year and one-half, with no trouble until now.

We tried adding hydrofluoric acid until the pH was 5.6 but this made more trouble. Then we added ammonia until the pH was 6.2 and this helped some. We also added more nickel sulphate, about 6 oz. per gallon; the metallic content is now 6.4 oz. per gallon. This helped a little but not enough to cure the whole trouble. We have installed a hydrofluoric acid dip for cleaning after the cyanide dip. This made no noticeable improvement. Then we tried a copper strike after the cleaning and cyanide dip. This worked for several days, but as the strike is not convenient to the other tanks, we stopped using it for several days and again have about as much trouble as before.

To prevent hydrogen depositing in or under the plate we use sodium perborate and hydrofluoric acid. Increasing the proportions of these ingredients has not helped. We also made up a new nickel solution according to the formula above, but this produces the plate that peels too.

What in your opinion is causing the peeling?

A.—Your methods of cleansing and plating seem to be all right, with the possible exception of the reverse current used before nickel plating. We rather believe that the direct current should be used here.

We do not believe that your trouble is due to a condition of any of the constituents of the nickel solution, but rather to very fine particles of dust or dirt on top of the nickel solution or in the atmosphere. These particles adhere to the copper plated shells and prevent the proper adherence of the nickel deposit. We suggest that you have the final rinse water located as near the nickel tank

as possible; that you agitate the cathode or else have a current of clean air blown over the top of the nickel solution or at least at the place where the work enters the nickel solution.

Kindly advise as to results after trying these suggestions.

—OLIVER J. SIZELOVE.

Silver Plating Data

Q.—We are using a silver plating solution something like the first of the two given on page 13 of Platers' Wrinkles, but we are having trouble with it. When the deposit is scratched brushed it comes off. We added sodium cyanide to make a total of 7 oz. to the gallon. We wanted a bright silver deposit when taken out of the solution. I tried to use what I thought was bisulphide of carbon in the following proportions: cyanide of silver solution 2 gallons, bisulphide of carbon 5 dwt., putting one teaspoonful of this mixture into each gallon of the silver solution. However, in going over the supplies, I found that instead of bisulphide of carbon I had used disulphide of carbon. I do not know how this has injured the solution but we cannot get the deposit to stick. The under surface is clean copper plate. The solution is 20 gallons. How can it be put in shape? We are just working up this end of the business, doing some replating of silverware. We use a 6 volt dry battery for current, not having a dynamo or DC current here. I wonder if the current is causing our trouble?

We have a 3 gallon silver solution made with potassium cyanide instead of sodium cyanide. This produces a plate that will stick on through the scratchbrushing operation.

I am sending you a 3 oz. sample of the solution we are having trouble with.

A.—Analysis of silver solution:

Metallic silver	1.92 oz.
Free cyanide	8.36 oz.
Carbonates	.02 oz.

The free cyanide content is entirely too high but we do not believe that this is causing your trouble. We believe that your trouble is with the cleansing methods and the source of current. Instead of using a dry cell, procure a storage battery, which will give you better results.

Before plating in the silver solution, it is necessary to use a silver strike. This solution should contain $\frac{1}{2}$ oz. of silver cyanide and 6 oz. of sodium cyanide to 1 gallon of water.

Carbon bisulphide and carbon disulphide are the same chemical.

As an up to date book on plating, we would recommend **Electroplating and Electroforming** by Blum and Hoggaboom.

—OLIVER J. SIZELOVE

Sulphate Copper Under Chromium

Q.—One of our customers states that their decorative copper plating under nickel and chromium is done with blue vitreol because of the fact that they obtain a harder and more dense deposit than could be obtained with the alkaline cyanide solution and asked us if this practice is correct.

We should appreciate any information you can supply on this subject.

A.—While there is considerable difference in the character of a deposit of copper from a sulphate bath and one from a cyanide bath, it is not for this difference entirely that preference is given to the sulphate bath for depositing copper previous to nickel and chromium plating.

It is considered good practice in chromium plating to eliminate as far as possible all alkaline plating solutions, for in doing so less trouble is encountered by the deposit raising when the chromium plate is applied, especially where the base metal is iron or steel.

—OLIVER J. SIZELOVE.

Statuary Bronze

Q.—We would like to get some information on producing a brown finish. What we desire to do is to dip our material from the copper plate into some solution that will give us an even colored brown finish.

A.—The brown finish you desire is called Statuary Bronze. It is produced by dipping the copper plated articles in a solution of sulphuret of potassium (called liver of sulphur). This solution is best made up in the proportion of $\frac{1}{4}$ oz. per gallon of water. The articles are dipped up and down in it until an iridescent purple coloration is obtained. At this point the articles are rinsed off in water and scratch-brushed with plenty of water and a soft steel scratch brush running 1,200 to 1,400 R.P.M. A brown color is obtained. Rinse the articles in clean cold water; then in hot water to dry; lacquer.

—JOSEPH HAAS.

Tin Plate on Aluminum

Q.—Will you kindly let me have a formula for a solution which will put a tin plate on aluminum? If there is such a formula, kindly let me know how to control the solution.

A.—Plating on aluminum is mainly a problem in preparing the surface of the aluminum to receive a deposit. We refer the writer to the article by Haro'd K. Work in the Transactions of the American Electrochemical Society, April 11th, 1928, "Electroplating on Aluminum and its Alloys," paper No. 23. Particular attention should be paid to page 283, on which is described the most successful method. After the aluminum has been given the preliminary coating of metal, the tin deposition would be the same as tin plating upon any other metal.

—JOSEPH HAAS.

Tumbling Castings

Q.—We would like to ask if you can help us on the tumbling problem. We are taking our brass castings and rolling them in a mixture of about .5 washed sand, .4 roofers' gravel and .1 powdered lime stone. This gives us a mixture which cuts the rough castings to a smooth surface, but it will, every little while, stop our drain, due to the lime settling in this drain. We would appreciate very much if you could suggest some other mixture or anything that would eliminate this trouble.

A.—Although we would willingly help you, we cannot do so in the manner you desire. Your method is the most popular for smoothing castings. All we can recommend is what we know others are doing who tumble castings as you do; that is, to flush down your drain pipes with a high pressure water stream once a day or two or three times a day, depending on the volume of work you do.

—JOSEPH HAAS.

Bronze Plating

Q.—We have been having some difficulty with our bronze plating solution due to the fact that the color of the plate is too red. We have tried changing the voltage, but this seems to have little or no effect. Adding zinc carbonite improves the condition, but only temporarily. We would appreciate very much receiving any suggestion that you can make, and are forwarding sample of the present solution to you today.

A.—Analysis of bronze solution:

Metallic copper.....	1.73 ozs.
Metallic zinc.....	0.09 oz.
Free cyanide.....	0.20 oz.

Analysis shows solution to be a little low in zinc and quite low in free cyanide. We suggest that you add to the solution 1 ounce of sodium cyanide to each gallon of solution, and if color is still too red add zinc carbonate that has been dissolved in sodium cyanide until the desired color is obtained.

Temperature plays a very important part in controlling a uniform color in a bronze solution, so we would suggest that you have a steam coil placed in the tank, and when proper temperature has been found, to regulate your work accordingly.

—OLIVER J. SIZELOVE.

Associations and Societies

American Electroplaters' Society

Los Angeles Branch (Temporary)

HEADQUARTERS, CARE OF M. D. RYNKOF'S, 1354 WEST 25TH STREET,
LOS ANGELES, CALIFORNIA

Election of Officers

At the August meeting of the newly formed Los Angeles Branch of the American Electroplaters Society the following were elected to office for the ensuing fiscal year:

C. E. Thornton, president; D. M. Bedwell, vice-president; M. D. Rynkofs, secretary-treasurer; C. Russell, librarian; J. Jacques, sergeant-at-arms. The Board of Managers will consist of E. W. Francis, H. H. Dimmitt and F. C. Rushton.

The meeting, held at the Central Y. M. C. A. on the second Wednesday evening of the month, the regular meeting time, was started with dinner, to which 33 men sat down. There were four visitors: Mr. Maurer, chemical engineer, Edison Application Company, Ontario, Calif.; R. Wild; R. J. Lockie; and M. McBenett. The two last named applied for membership. There were letters from E. W. Heil, who is expected to be at the next meeting, and from J. Caslis, Providence, R. I., on Gold Plating. Mr. Caslis will be sent a vote of thanks for his interest in the new Branch.

There was discussion of various plating problems, including pitting of nickel, gold plating and chromium.

The regular September meeting was held as usual the second Wednesday at the Y. M. C. A., at 6:30 P. M. Thirty-seven sat down to dinner.

Joseph Corbit, with a few well chosen remarks, installed C. E. Thornton as president, who in turn installed the other officers.

We had two visitors, E. W. Heil, Wichita, Kan., and James Emmett, San Diego, Calif. Ed Heil gave us an interesting account of the convention, and read the main items of papers given at the recent convention. Jim Emmett complimented the new Branch on the enthusiasm shown and wished it success.

J. Ellis took charge of the educational program. Some interesting discussion took place.

—M. D. RYNKOFFS.

New York Branch

HEADQUARTERS, CARE OF J. E. STERLING, 2581 46TH STREET, ASTORIA, LONG ISLAND, NEW YORK

August Meeting

The New York Branch of the American Electroplaters' Society held its regular monthly meeting on Friday evening, August 23, at the World Building, Park Row, New York City. R. J. Liquori, vice-president of the Branch, presided. The intense heat cut down the attendance but those who came were there to learn something and Librarian Levine was showered with questions on all

phases of electroplating, to which he gave prompt, intelligent replies.

—C. HAUSHALTER.

Rochester Branch

HEADQUARTERS, CARE OF CHARLES GRIFFIN, 24 GARSON AVENUE, ROCHESTER, NEW YORK

Outing September 28

The Rochester Branch of the American Electroplaters' Society will hold its annual family outing and clam bake at the Old Homestead on Irondequoit Bay, N. Y., Saturday, September 28. There will be sports for all, a good shore dinner, and dancing. The arrangements are being made by a committee composed of Clarence Reama, Gerald A. Lux, Clarence O. Fields, Frank Mesek and Charles Griffin.

Meeting Held at Buffalo

The Branch held a dinner at Buffalo in August which was attended by members and friends from Buffalo, Niagara Falls and Rochester. After the dinner there were a number of good papers and addresses.

September Meeting

The September meeting will be held on the evening of the 27th, Friday, at which time it is expected that Supreme President Horace Smith, and Oliver J. Sizelove and George B. Hogaboom, two of the associate editors of THE METAL INDUSTRY, will be present to speak.

—CHARLES GRIFFIN.

Personals

Alfred K. Pritchard, Jr., of 50 Ninth Avenue, Newark, N. J., has been appointed by the Rumidor Corporation, Weehawken, N. J., as foreman electroplater.

Frank R. Frost, president of the Superior Steel Corporation, Pittsburgh, Pa., has been elected a director of the Copperweld Steel Company, Glassport, Pa.

Thomas Bowler, North Vancouver, B. C., has invented a valve of entirely new design, which will be manufactured by the Seattle Brass Company, Seattle, Wash.

Charles W. Burger, is now connected with the Adirondack Steel Foundries, Watervliet, N. Y., having formerly been foundry superintendent of the Pangborn Corporation, Hagerstown, Md.

Paul D. Merica, formerly assistant manager of the development and research department of the International Nickel Company, Inc., New York, has been appointed technical assistant to the president.

A. H. Corey, who recently resigned from the Piston Ring Company, Muskegon, Mich., is now general manager of the piston ring department of the Aluminum Industries Corporation, St. Cloud, Minn.

Andrew V. Re has been appointed engineering supervisor of electroplating for The Wahl Manufacturing Company, Chicago, Ill. In this capacity Mr. Re has charge of plating, polishing and all other finishing operations on Wahl products.

William Tyler Ball has been appointed to the position of sales engineer for the Burgess-Parr Company, Moline, Ill., where he will specialize in foundry products, including brass, bronze, aluminum and special alloy castings. He was formerly with the Deere Spreader Works, Moline.

William Gummere has been appointed general manager in charge of operation at Trenton for John A. Roebling's Sons Company. He was formerly open-hearth superintendent of the same company. **R. Mercur, Jr.**, is now taking Mr. Gummere's place in the open-hearth department.

Harry G. Hart has sold his interest in the Salem Brass and Iron Manufacturing Company, Bridgeton, N. J., to his former partners, **Joseph Powers** and **Thomas H. Powers**, and the company has been reorganized with Joseph Powers as president and Thomas H. Powers as secretary and treasurer.

H. W. Pearsall has been appointed vice-president and a member of the firm of Finishing Research Laboratories, Inc., Chicago, Ill. Mr. Pearsall has been on the engineering staff of the company for some time. He has had a wide experience in research on paints, lacquers, electroplating, etc., the announcement states.

Mark Weisburg, formerly president of the Textile Chemical Company, Inc., and treasurer of the Modern Plating Company, Providence, R. I., is now president of the Chromium Engineering Corporation, 132 West 42nd Street. Mr. Weisburg is a member of the American Chemical Society, the American Electrochemical Society and the American Association for the Advancement of Science.

J. S. Gillard has been placed in charge of sales of McKeon's "Liquid Sulphur" by the Sulphur Products Company, Greensburg, Pa. Mr. Gillard at the same time is taking charge of the sales of "Natrolin" metal cleaner for the W. A. Fuller Company, also of Greensburg. According to the announcement by **Wilfred S. McKeon**, president of the Sulphur Products Company,

Mr. Gillard bids fair to making good progress in the plating industry.

Herman Arber has been appointed general plant superintendent for the Dudlo Manufacturing Company, Fort Wayne, Ind., subsidiary of the General Cable Corporation. He was formerly manager of the coil department and succeeds **Wendell C. Glass**, who recently resigned. Mr. Arber is succeeded in the coil department at Fort Wayne by **George Kierspe**, manager of the coil department at the Rome, N. Y., plant of the Dudlo company.

J. M. Roth, inventor of the hot molten welding process for making copper welded wire and other products, has resigned his position as chairman of the board of directors of the Copperweld Steel Company, Glassport, Pa. Mr. Roth was instrumental in founding the company. He was president until 1926, when he became chairman of the board. **Harrison Nesbit**, a director of the company and president of the Bank of Pittsburgh, succeeds Mr. Roth as chairman.

W. S. Rugg, vice-president of the Westinghouse Electric and Manufacturing Company, West Pittsburgh, Pa., has been appointed to the committee for

the award during the next five years of the Edison Medal given by the American Institute of Electrical Engineers for meritorious achievements in electrical science, engineering or arts. At the same time, **L. W. W. Morrow**, editor of *Electrical World*, and **R. F. Schuchardt** of the Commonwealth Edison Company were also appointed.

Edward Browning Sanigar, D.Sc., of Sheffield, England, investigator in electrodeposition for the British Government Electrodeposition Committee and the British Non-Ferrous Metals Research Association, has been recommended as the first Weston Fellow by the Weston Fellowship Committee of the American Electrochemical Society. Dr. Sanigar has been honored similarly in the past by being given the first foreign travel scholarship of the Worshipful Company of Cutlers, London, England. He has been engaged in electrochemical research for many years and has contributed a great deal to the literature of the science of electrodeposition. He has been particularly interested in silver plating from cyanide solutions and of late has taken up the study of chromium deposition. In 1929-1930 he will continue his investigations at Columbia University under Professor Colin G. Fink.

Business Reports in Brief

Bassick Company, Bridgeport, Conn., does not contemplate the construction of a factory. This corrects a recent report.

St. Louis Rust Proof Company, Broadway and Poplar Streets, St. Louis, Mo., plans a two-story addition to its chromium plating plant.

Western Foundry Company, Chicago, Ill., has awarded contract for two one-story additions to its factory at 3634 South Kedzie Avenue.

Stilson Manufacturing Company, West Orange, N. J., has leased the building at 82 Main Street, for the manufacture of metal goods and novelties.

Anaconda American Brass Ltd., has awarded contract for a two-story service building in connection with a proposed \$500,000 expansion program.

Globe Machine and Tool Company, Newark, N. J., has leased floor in building at 261 Rose Street, to manufacture tools, dies and kindred specialties.

General Porcelain Enameling Company, 4100 Schubert Avenue, Chicago, Ill., has awarded contract for a one-story factory, 26 x 125 ft., to cost \$3,000.

American Gas Furnace Company, Elizabeth, N. J., is now represented on the Pacific Coast by **W. E. Worth**, 216 Pine Street, Room 518, San Francisco, Cal.

Steel Company of Canada, Hamilton, Ont., Can., is having plans prepared for the construction of a galvanized wire plant on Burlington Street. Estimated cost \$500,000.

Homer D. Bronson Company, Beacon Falls, Conn., has awarded contract for a two-story, 35 x 100 ft., factory for the manufacture of brass goods. Estimated cost is \$45,000.

Aluminum Company of America, Inc., Pittsburgh, will soon break ground for a one-story addition to plant at Maryville, Tenn., 45 x 490 ft., to cost more than \$125,000 with equipment.

Titan Electric Company, Butler, Ind., manufacturer of electrical equipment, has arranged for the removal of its plant to Adrian, Mich., where increased capacity will be made available.

Anaconda Wire and Cable Company, Sycamore, Ill., will install wire-drawing machines and electric

annealing ovens in its plants and expects to require 100 to 150 additional employees.

Renfrew Industries Ltd., **J. A. Law**, manager and director, plans the construction of an addition to its plant for the manufacture of refrigerators and kitchen cabinets. Estimated cost is \$50,000.

Whiteway Stamping Company, Cleveland, Ohio, manufacturer of metal stampings, has awarded a contract for a one and two-story plant on E. 70th Street; estimated cost is \$80,000 with equipment.

Central Brass and Aluminum Foundry Company, 503 South 21st Street, St. Louis, Mo., **F. T. O'Hare**, president, has completed an addition to its plant which will make possible an increase of 50% in production.

National Bronze and Aluminum Foundry Company, East Eighty-eighth Street and Laisy Avenue, Cleveland, Ohio, will enlarge its plant by erection of a one-story building, 71 x 109 x 200 ft., monitor type.

Wagner Electric Corporation, St. Louis, Mo., announces the appointment of **James G. Pattillo, Jr.**, as manager of its Pittsburgh branch sales office. **Ralph R. Rugheimer** has been made a member of the company's Atlanta branch sales office.

Williams Alloy Products Company, Elyria, Ohio, manufacturer of bearing metals, etc., is planning an expansion and improvement program including the installation of additional equipment at its plants in order to provide for larger output.

American Abrasive Metals Company, Newark, N. J., has completed a 50 x 75-foot addition to its foundry. This is for use as a finishing and shipping department and is being equipped with grinding wheels, electric torches and similar equipment.

Southern Aviation Enterprises, formed recently by a group of prominent Atlanta business men, with headquarters in the Palmer Building, Atlanta, Ga., has announced plans for the erection of an airplane factory either at Birmingham, Ala., or New Orleans, La.

Duraloy Company, Pittsburgh, Pa., has installed a 1½-ton electric furnace at a plant at New Cumberland, W. Va., for the production of chrome alloys.

Additions also have been made to the plant machine shop to facilitate the output of machines for chrome alloy castings.

Trumbull Electric Manufacturing Company, Plainville, Conn., manufacturer of electric switches, controls, etc., affiliated with the General Electric Company, Schenectady, N. Y., is reported planning a new addition to cost close to \$175,000 with equipment.

Stanley Works, New Britain, Conn., has acquired the **R. L. Carter Company, Inc.**, Phoenix, N. Y., and will operate it as a separate unit. **F. O. Fuller** of the purchasing department of the Stanley Works, has been transferred to Phoenix to manage the business.

Fairmont Manufacturing Company, Fairmont, W. Va., is said to be planning expansion of its duralumin sheet manufacturing plant, primarily for metal aircraft production, to include installation of rolling mill equipment, electric furnace and auxiliary equipment, at reported cost of more than \$75,000.

Day Name Plates, Limited, of 4 Woodfield Road, Toronto, 8 Canada, has changed its firm name to **Metal Etchers and Manufacturers, Ltd.**, and its address to 514 King Street East, Toronto, 2, Canada. The company has a new plant at King Street, which was made necessary by increased business.

Burgess Aeronautical and Engineering Corporation, Santa Monica, Cal., is planning a new local plant for the manufacture of special aircraft of the amphibian type with rotary valve engines and accessories, consisting of one-story units; reported cost will be in excess of \$70,000 with equipment.

Irving Air Chute Company, 372 Pearl Street, Buffalo, N. Y., manufacturer of aviation equipment, is said to be arranging for early operation of a new branch plant at Los Angeles, Calif., to cost more than \$75,000 with equipment. The new unit will be used for manufacturing for Pacific Coast trade.

Alamo Airplane Company, Milam Building San Antonio, Tex., has plans for an aircraft manufacturing plant with initial unit of 106 x 300 ft., for parts production and assembling, to cost about \$40,000 with equipment. **A. W. Forrester** is one of the heads of the company; **Boyd Hammond** is company engineer.

Fleet Aircraft, Inc., Buffalo, N. Y., manufacturer of commercial airplanes and parts, is considering establishment of a new assembling plant in Southern California for Pacific Coast trade. The cost will be more than \$75,000 with equipment. The company is affiliated with the **Consolidated Aircraft Company**, Buffalo, N. Y.

Fokker Aircraft Corporation of America, Inc., Glendale, near Wheeling, W. Va., is projecting plans for two new branch plants, one to be located in vicinity of San Francisco, for parts production and assembling, and other at McCook Field, Dayton, Ohio, recently acquired. Both works, it is reported, will cost more than \$200,000.

Inca Manufacturing Corporation, Ft. Wayne, Ind., recently organized to manufacture magnet wire, windings and electrical specialties for the automotive, radio and electrical industries, has awarded general contract for a plant, 200 x 300 ft., on New Haven Avenue. The company is in the market for materials and equipment for plant.

The corporate name of **Smith Wheel Inc.**, Syracuse, N. Y., has been changed to **Syracuse Perfection Castings Inc.** The company has terminated the wheel division and now is concentrating all efforts in the casting division, which was established in 1882. The company manufactures aluminum, brass, bronze, malleable, and gray iron castings.

Consolidated Aircraft Corporation, Buffalo, N. Y., is planning the early removal of the plant of the **Thomas-Morse Aircraft Corporation**, Ithaca, N. Y. manufacturer of all-metal airplanes, recently acquired, to Buffalo, where a new unit will be established for this branch of production, including aircraft for military service. Present capacity will be increased.

Higert Chrome Company, 2019 Spruce Street, Detroit, Mich., has been established by **H. Higert**, president, and **J. L. Watson**, secretary-treasurer, and is operating a general plating plant installation service. The company also does consulting work in electroplating, covering chromium, copper, nickel, etc. Mr. Higert was formerly shop manager of the General Chromium Corporation.

Eastern Aircraft Corporation, Pawtucket, R. I., recently organized by **R. C. Van Arsdale** and associates, has acquired the plant there of the **Pressed Metal Company** for the manufacture of all-metal aircraft. The company will be affiliated with the **Bavarian Aircraft Corporation** of Germany, and will produce in this country Messerschmidt type of aircraft now being manufactured there.

Apex Electrical Manufacturing Company, Cleveland, Ohio, manufacturer of electric-operated cleaning equipment, etc., has acquired the plant and business of the **Johnson Washer Company**, Oakland, Calif., manufacturer of kindred equipment, and will consolidate with that organization. The Oakland plant will continue in operation for Pacific Coast trade, and expansion will be carried out.

Beuscher Band Instrument Company, and **C. G. Conn, Ltd.**, manufacturers of brass musical instruments, both of Elkhart, Ind., and **Leedy Manufacturing Company** of Indianapolis, manufacturer of similar instruments, have perfected merger plans. The companies will retain present identities and plans will continue at existing locations, with expansion in different divisions for enlarged output.

The Pangborn Corporation, Hagerstown, Md., manufacturer of sand blast and dust collecting equipment, has taken over the **Universal Shot and Sand Blast Company**, Hoboken, N. J. Universal equipment, parts and supplies will be manufactured and distributed by the Pangborn organization. **Robert E. Donnelly** and **Frank C. Weber**, sole owners of the Universal business, are now associated with the Pangborn Corporation.

Aero Supply Company, College Point, L. I. manufacturer of aircraft hardware, etc., has work under way on a new addition and will equip to provide about 25 per cent in present capacity, reported to cost more than \$60,000. The company has recently acquired **National Steel Products Company**, Dayton, Ohio, manufacturer of steel specialties for aircraft, and **Standard Automatic Products Corporation**, Corry, Pa., manufacturer of turnbuckles, etc., for airplane service.

Federal Electric Company, 8700 South State Street, Chicago, has concluded arrangements for the purchase of the **Loper Fire Alarm Company**, Stonington, Conn., manufacturer of wireless fire alarm systems and devices, and will consolidate with the organization. It is proposed to remove the Stonington plant to Chicago, where production will be concentrated and increased. **A. P. Loper**, heretofore head of acquired company, will continue with organization as consulting engineer.

Farman Aircraft Company, care of **H. R. Tucker**, Tulsa, Okla., recently formed as an affiliated interest of **Farman Brothers**, Paris, France, manufacturers of

large aircraft, is planning early construction of a new plant in the vicinity of Wheeling, W. Va., for the manufacture of aircraft, motors, parts, etc. The company also proposes to establish eastern assembling works and has taken options on site at Central Airport, Camden, N. J., for this plant.

General Bronze Company, Pittsburgh, has concluded arrangements for purchase of **Guaranty Iron and Steel Company**, Chicago, and **Wisconsin Ornamental Iron and Bronze Company** of Milwaukee, and will consolidate with organization. Proposed to continue plants at present locations and will carry out expansion program for increased output. The company is making improvements at Pittsburgh works, including installation of additional equipment.

J. B. Ripley Brass Foundry, Inc., Windsor, Vt., recently moved into its new plant north of Coolidge Court on a plot of land $4\frac{1}{4}$ acres in extent with a frontage of 900 ft. on the railroad track. The new foundry, 40 x 140 ft., is modern throughout and is equipped to the fullest extent with mechanical aids. The present capacity of the plant is 4 tons of finished castings per day. Provision has been made on the north side of the building for future addition.

I. Fischman and Sons, Inc., Tenth Street and Allegheny Avenue, Philadelphia, Pa., manufacturer of soda fountain equipment, is planning consolidation of three existing plants in new two- and three-story factory on Erie Avenue, including former plant of **Stanley H. Knight Company**, Chicago, lately acquired for consolidation with Fischman organization. The new plant will provide about four times present floor space and is estimated to cost \$1,500,000 with machinery.

The **Phoell Manufacturing Company of Minnesota**, a subsidiary of the **Phoell Manufacturing Company of Chicago**, will take over and operate as a direct warehouse and sales office, the bolt, nut and screw business, formerly conducted through the **Irvine Brass and Copper Company** of Minneapolis. The sales office and warehouse will be located at 405 Second Avenue north. **J. D. Shotwell**, former vice-president of the **Irvine Brass and Copper Company**, will take over the management of the new organization.

Wagner Electric Corporation, St. Louis, Mo., announces the opening of a new branch sales office at 734 Allen Building, Dallas, Texas, to cover the entire state of Texas and parts of Louisiana and Arkansas. **Alfred B. Emrick** has been placed in charge as man-

ager. Mr. Emrick joined Wagner Electric in 1915, was a salesman in Detroit and Toledo districts until 1921, then went into business for himself until 1926 at which time he rejoined Wagner. Early in 1927 he was appointed branch manager of the Pittsburgh office, whence he was transferred on September 1, 1929, to take charge of the newly established Dallas sales office.

Aluminum Company of America, Pittsburgh, Pa., has organized a new power subsidiary under the name of **Nantahala Power and Light Company**, to carry out a hydroelectric power project in Tennessee, supplementing the developments of the **Knoxville Power Company**, Knoxville, another affiliated interest. The new company will have a capital of \$10,000,000. Plans are under way for a hydroelectric power plant near Fontana on the Tennessee river, to be followed by similar developments at Bushnell, Needmore and Aquone. Entire project will cost over \$75,000,000, with transmission system, including hydroelectric power plant of the Knoxville Power Company, now under way at Calderwood.

New Ajax-Wyatt Furnace Plant

The Ajax Metal Company, Philadelphia, Pa., has just completed construction of an entirely new plant for the manufacture of Ajax-Wyatt electric melting furnaces, having outgrown its original facilities. Ample provision has been made for carrying on experimental work, it is stated, as well as for the most modern storage and handling of parts, lining materials, etc., for servicing the furnaces. The new building is located on Frankford Avenue, below Girard Avenue, Philadelphia.

Hill-Curtis Company Takes New Name

The Hill-Curtis Company, Kalamazoo, Mich., manufacturers of polishing, grinding and sawing machinery, has changed its name to **Hammond Machinery Builders, Inc.**, according to a statement issued by W. C. Hammond, president. Mr. Hammond writes that 12 years ago he went to Kalamazoo, where he developed the three lines of machinery in which the firm specializes. Since there are neither Hills nor Curtises connected with the company now, the firm being owned by Mr. Hammond, it has been deemed advisable to change the name to one more indicative of its ownership and products.

New Companies

Industrial Pattern and Foundry, New York, has been incorporated with \$2100 capital, by H. T. Weeks, 18-30 Astoria Avenue, Long Island City, N. Y.

Weldon Foundry Company, Wayne, Mich., has been incorporated with 5000 shares of no par stock to operate a general metal and iron foundry by **John Enot**.

Mackenite Metal Corporation, Fieldsboro, N. J., has been incorporated with 1000 shares of common stock to manufacture metal castings, by **R. P. Rimo**, American Mechanic Building, Trenton, N. J.

North Shore Foundry Company, Greenfield Avenue, Waukegan, Ill., has been incorporated with \$50,000 capital by **John Rause, Jr.**, to manufacture and sell castings, copper, brass, iron, and steel products.

Montreal Foundry Ltd., Montreal, Que., Can., has

been incorporated to manufacture and deal in brass, iron, steel and other metals with \$199,000 capital, by **Wm. Bayliss**, **A. S. Wilson** and **R. Leblanc**, all of Montreal.

Hale Aeroplane and Motor Vehicle Manufacturing Company, Welch, W. Va., has been organized with a capital stock of \$50,000 to manufacture airplanes. The company is contemplating construction of a plant. **William Hale** is president.

E. Gargani and Sons, Inc., Brooklyn, N. Y., has been organized to operate a statuary bronze foundry. A long term lease has been secured on a foundry building at 100 Probst Street, in which extensive alterations and improvements have been made.

Gordon F. Carr, 135 Chapin Street, Binghamton, N. Y., and associates have organized the **Carr Home Appliances Company**, to operate a local plant for the

manufacture of electrical appliances and equipment. **R. E. Cohee**, 160 Chapin Street is also interested in the new company.

Wandtk Pattern and Foundry Company, Inc., 1700 Ohio Avenue, Anderson, Ind., has been incorporated for \$25,000 to manufacture wood and metal patterns and brass, bronze and aluminum castings. The company is now conducting jobbing foundry in a new plant at above address.

Toy and Specialty Manufacturing Company, Richmond, Va., has been organized to take over and consolidate the **Berger Specialty Manufacturing Company**, and **Bruner Lumber Company**, manufacturer of light fabricated steel and other metal products, toys,

aircraft landing apparatus, etc. The consolidated company will continue production at both plants, and plans immediate expansion with installation of additional equipment.

Kellett Aircraft Company, care of **N. S. Ludington**, 123 S. Broad Street, Philadelphia, Pa., head of the **Central Airport**, Camden, N. J., has been formed under Delaware laws and plans construction of a new plant at airport noted for the manufacture of special aircraft, for which patent license has been secured from **Pitcairn-Ciebra Autogiro Company**, Philadelphia, Pa., **Harold F. Pitcairn**, head. Initial unit will be one story and is reported to cost more than \$65,000 with equipment.

Trade Publications

The Polytechnic Institute of Brooklyn, New York. Bulletin of graduate courses 1929-30.

Ford Charcoal Briquets. Ford Motor Company, Dearborn, Mich. Booklet on foundry fuel.

Laclede-Christy Clay Products Company, St. Louis, Mo. Leaflet on fire brick and refractories; illustrated.

Building a Better Box Header Boiler. Combustion Engineering Corporation, New York City. Leaflet, illustrated.

The Denham Costfinder for General Managers. The Denham Costfinding Company, 3030 Euclid Avenue, Cleveland, Ohio.

Executives Service Bulletin No. 9. Policyholders Service Bureau, Metropolitan Life Insurance Company, New York City.

Trent Laboratory Apparatus Heated Electrically. Harold E. Trent Company, 439-443 North 12th Street, Philadelphia, Pa. Leaflet TA-23.

Oesterlein Aurora Drills. The Aurora Tool Works, Cincinnati, Ohio. Complete catalog of the company's line of drilling machines. Illustrated.

Stop the Crowds with Chromflex. Apollo Metalarts, La Salle, Ill. Handsome brochure on chromium plated sheets for display and other purposes.

Wagner Squirrel-Cage Motors. Wagner Electric Corporation, St. Louis, Mo. Discussion of 7 types of squirrel-cage motors in 24-page illustrated booklet.

United States Construction Quarterly. David Lawrence Publications, Washington, D. C., April-June, 1929, issue. Information on construction from Government sources.

Globe Seamless Steel Tubes. Globe Steel Tubes Company, Milwaukee, Wis. Large illustrated book covering manufacture of seamless tubes, showing equipment and operations.

Electric Heat for Industry. Public Service Company of Northern Illinois, Chicago, Ill. Large, 33-page illustrated book describing applications of electric heat in industry.

Gas Welding and Cutting Apparatus. Torchwell Equipment Company, Chicago, Ill. Catalog No. 29, covering complete line of this company's products, in 40 pages, 8½ by 11 in.

Quinn Oil Burning Equipment. Combustion Engineering Corporation, 200 Madison Avenue, New York City. Torches, cocks, valves, steam atomizing oil burners, low pressure burners.

Gehnrich Foundry Ovens. Gehnrich Oven Company, Inc., Long Island City, N. Y. Ovens for baking, mold drying, pasting, blacking, preheating, aging, normalizing, etc.; 16 pages, illustrated.

Nichrome—The Heat Resisting Alloy. Driver-Harris Company, Harrison, N. J. Fine illustrated book showing various applications of Nichrome alloy, especially in foundries and metal working plants.

Duriron Exhaust Fans. The Duriron Company, Inc., Dayton, Ohio. Bulletin No. 158, 12 pages, illustrated, covers exhausters for fumes from corrosive and other liquids, hoods, fume ducts and ventilators.

Pickl-Aide. The Weaver Brothers Company, Adrian, Mich. Monthly publication of small size, edited by Curt Weaver, consisting of calendar, note pages and some comments and advertising relative to pickling of metals.

Rare Metals. Fansteel Products Company, Inc., North Chicago, Ill. The history, properties and uses of tantalum, tungsten and molybdenum; a 54-page, illustrated book containing interesting and valuable information; free on request to the company.

Columbia Electroplating Generators. The Columbia Electric Manufacturing Company, 1292 East 53rd Street, Cleveland, Ohio. A 16-page illustrated catalog of generators for various types of plating plants. Construction details and other engineering data are given.

Chase Copper Water Tubing. Chase Brass and Copper Company, Inc., Waterbury, Conn. Catalog of water tubing and compression fittings for easy replacement; trade edition; 48 pages, profusely illustrated. Explains the use of the product, with complete directions for installation.

The Homo Method for Production Tempering. Leeds and Northrup Company, Philadelphia, Pa. Catalog No. 93, 32 pages, illustrated. This company also has just issued **Optical Pyrometers**, catalog No. 86, 28 pages, illustrated; and **Potentiometer Pyrometers**, catalog No. 87, 44 pages, illustrated.

Reliance Plating and Polishing Equipment. Charles F. L'Hommedieu and Sons Company, 4521 Ogden Avenue, Chicago, Ill. Bulletin No. 105, a 95-page illustrated catalog showing a complete line of generators, mechanical plating apparatus, polishing machinery, supplies for platers and polishers, etc. A handsome catalog which should be kept handy by all platers, polishers and finishers. The book is handsome and well bound.

Metal Prices, September 23, 1929

NEW METALS

Copper: Lake, 18.125. Electrolytic, 18.00. Casting, 17.75.
Zinc: Prime Western, 6.775. Brass Special, 6.875.
Tin: Straits, 45.375. Pig, 99%, 44.75.
Lead: 6.70. Aluminum, 24.30. Antimony, 8.875.

Nickel: Ingot, 35. Shot, 36. Elec. 35. Pellets, 40.
Quicksilver: flask, 75 lbs., \$125. Bismuth, \$1.70.
Cadmium, 95. Cobalt, 97%, \$2.60. Silver, oz., Troy, 50.50.
Gold: oz., Troy, \$20.67. Platinum, oz., Troy, \$62.00.

INGOT METALS AND ALLOYS

Brass Ingots, Yellow	12¾ to 14
Brass Ingots, Red	15¾ to 16¾
Bronze Ingots	16¾ to 20
Casting Aluminum Alloys.....	21 to 24
Manganese Bronze Castings	27 to 39
Manganese Bronze Ingots	15 to 20
Manganese Bronze Forgings	35 to 43
Manganese Copper, 30%	30 to 40
Monel Metal Shot	28
Monel Metal Blocks	28
Parsons Manganese Bronze Ingots.....	16½ to 19¾
Phosphor Bronze	17 to 21
Phosphor Copper, guaranteed 15%.....	21½ to 25
Phosphor Copper, guaranteed 10%.....	20½ to 24
Phosphor Tin, no guarantee.....	51 to 65
Silicon Copper, 10%, according to quantity.....	30 to 25

OLD METALS

Buying Prices		Selling Prices
15¾ to 15¾	Heavy Cut Copper	16¾ to 16¾
14½ to 14½	Copper Wire, Mixed	15½ to 15½
13 to 13½	Light Copper	14 to 14½
12 to 12½	Heavy Machine Composition.....	13 to 13½
8¾ to 9	Heavy Brass	9¾ to 10
7 to 7½	Light Brass	8 to 8½
9½ to 10	No. 1 Rod Brass Turnings.....	10½ to 11
11¼ to 11¾	No. 1 Composition Turnings.....	12¼ to 12¾
5¾ to 5¾	Heavy Lead	6¾ to 6¾
3¾ to 4¾	Zinc Scrap	4¼ to 5¼
8 to 8½	Scrap Aluminum Turnings.....	9 to 9½
11½ to 12	Scrap Aluminum, cast alloyed.....	16½ to 17
17 to 18	Scrap Aluminum sheet (new).....	20 to 20½
30 to 32	No. 1 Pewter	35 to 38
20 to 21	Old Nickel Anodes	22 to 23
20 to 23	Old Nickel	22 to 25

Wrought Metals and Alloys

COPPER SHEET

Mill shipment (hot rolled) 27¾ to 28¾c. net base
From Stock 28¾ to 29¾c. net base

BARE COPPER WIRE

19½c. to 19¾c. net base, in carload lots.

COPPER SEAMLESS TUBING

29¼c. to 30¼c. net base.

SOLDERING COPPERS

300 lbs. and over in one order 26¼c. net base
100 lbs. to 200 lbs. in one order 26¾c. net base

ZINC SHEET

Duty sheet, 2c. per lb. Cents per lb.
Carload lots, standard sizes and gauges, at mill,
less 7 per cent discount 10.25 net base
Casks, jobbers' price 10.50 net base
Open casks, jobbers' price 11.00-11.50 net base

ALUMINUM SHEET AND COIL

Aluminum sheet, 18 ga., base, ton lots, per lb. 33.30
Aluminum coils, 24 ga., base, price 31.00

ROLLED NICKEL SHEET AND ROD

Net Base Prices

Cold Drawn Rods..... 53c. Cold Rolled Sheet..... 60c.
Hot Rolled Rods..... 45c. Full Finished Sheet..... 52c.

BLOCK TIN SHEET

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge
or thicker, 100 lbs. or more 10½c. over Pig Tin; 50 to 100 lbs.,
15c. over; 25 to 50 lbs., 17c. over; less than 25 lbs., 25c. over.

SILVER SHEET

Rolled sterling silver 52.50c., Troy oz., upward according to
quantity.

BRASS MATERIAL—MILL SHIPMENTS

In effect April 16, 1929.

To customers who buy 5,000 lbs. or more in one order.

	Net base per lb.		
	High Brass	Low Brass	Bronze
Sheet	\$0.23¾	\$0.25	\$0.26¾
Wire	.23¾	.25½	.26¾
Rod	.21¾	.25¾	.27
Brazed tubing	.30¾		.35¾
Open seam tubing	.31¾		.34¾
Angles and channels	.31¾		.34¾

BRASS SEAMLESS TUBING

28¾c. to 29¼c. net base.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod 25¼c. net base
Muntz or Yellow Metal Sheathing (14"x48")... 24c. net base
Muntz or Yellow Rectangular sheet other
Sheathing 25c. net base
Muntz or Yellow Metal Rod 22¼c. net base
Above are for 100 lbs. or more in one order.

NICKEL SILVER (NICKELENE)

Net Base Prices

Grade "A" Sheet Metal		Wire and Rod	
10% Quality.....	31¾c.	10% Quality.....	34¾c.
15% Quality.....	33c.	15% Quality.....	37¾c.
18% Quality.....	34¾c.	18% Quality.....	41c.

MONEL METAL SHEET AND ROD

Hot Rolled Rods (base). 35 Full Finished Sheets (base) 42
Cold Drawn Rods (base) 40 Cold Rolled Sheets (base).. 50

BRITANNIA METAL SHEET

No. 1 Britannia—18" wide or less, No. 26 B. & S. Gauge or
thicker, 500 lbs. or over, 8c. over N. Y. tin. price; 100 lbs. to
500 lbs., 10c. over; 50 to 100 lbs., 15c. over; 25 to 50 lbs., 20c.
over; less than 25 lbs., 25c. over. Prices f. o. b. mill.

Supply Prices, September 23, 1929

ANODES

Copper: Cast	28c. per lb.	Nickel: 90-92%	45c. per lb.
Rolled, oval	27c. per lb.	95-97%	47c. per lb.
Rolled, sheets, trimmed	27¾c. per lb.	99%	49c. per lb.
Brass: Cast	27c. per lb.	Silver: Rolled silver anodes .999 fine are quoted from 54c.	
Zinc: Cast	12½c. per lb.	per Troy ounce upward, depending upon quantity.	

FELT POLISHING WHEELS WHITE SPANISH

Diameter	Thickness	Under 100 lbs.	100 to 200 lbs.	Over 200 lbs.
10-12-14 & 16"	1" to 3"	\$3.00/lb.	\$2.75/lb.	\$2.65/lb.
6-8 & over 16	1 to 3	3.10	2.85	2.75
6 to 24	Under ½	4.25	4.00	3.90
6 to 24	½ to 1	4.00	3.75	3.65
6 to 24	Over 3	3.40	3.15	3.05
4 up to 6	¼ to 3	4.85	4.85	4.85
4 up to 6	Over 3	5.25	5.25	5.25
Under 4	¼ to 3	5.45	5.45	5.45
Under 4	Over 3	5.85	5.85	5.85

Grey Mexican Wheel deduct 10c per lb. from White Spanish prices

COTTON BUFFS

Full Disc Open buffs, per 100 sections.

12" 20 ply 64/68 Unbleached	\$28.27 to \$28.30
14" 20 ply 64/68 Unbleached	36.45 to 37.34
12" 20 ply 80/92 Unbleached	31.25 to 34.16
14" 20 ply 80/92 Unbleached	42.40 to 46.09
12" 20 ply 84/92 Unbleached	36.60 to 39.31
14" 20 ply 84/92 Unbleached	49.60 to 57.60
12" 20 ply 80/84 Unbleached	38.35 to 39.37
14" 20 ply 80/84 Unbleached	52.00 to 53.12
Sewed Pieced Buffs, per lb., bleached	52c to 71c.

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	14-19	Lacquer Solvents	gal.	.85
Acid—Boric (Boracic) Crystals	lb.	.08½	Lead Acetate (Sugar of Lead)	lb.	.13¼
Chromic 75 to 400 lb. drums	lb.	.19½-.21	Yellow Oxide (Litharge)	lb.	.12½
Hydrochloric (Muriatic) Tech., 20°, Carboys	lb.	.02	Mercury Bichloride (Corrosive Sublimate)	lb.	\$1.58
Hydrochloric, C. P., 20 deg., carboys	lb.	.06	Nickel—Carbonate, dry, bbls.	lb.	.35
Hydrofluoric, 30% bbls.	lb.	.08	Chloride, bbls.	lb.	.20
Nitric, 36 deg., carboys	lb.	.06	Salts, single, 300 lb. bbls.	lb.	.13
Nitric, 42 deg., carboys	lb.	.07	Salts, double, 425 lb. bbls.	lb.	.13
Sulphuric, 66 deg., carboys	lb.	.02	Paraffin	lb.	.05-.06
Alcohol—Butyl	lb.	.16¾-.21¼	Phosphorus—Duty free, according to quantity ..	lb.	.35-.40
Denatured, drums	gal.	.50-.60	Potash, Caustic Electrolytic 88-92% broken,		
Alum—Lump, Barrels	lb.	.03¼	drums	lb.	.093
Powdered, Barrels	lb.	.039	Potassium Bichromate, casks (crystals)	lb.	.09¼
Aluminum chloride solution in carboys	lb.	.06½	Carbonate, 96-98%	lb.	.06¾-.07
Ammonium—Sulphate, tech., bbls.	lb.	3.3	Cyanide, 165 lb. cases, 94-96%	lb.	.57½
Sulphocyanide	lb.	.65	Pumice, ground, bbls.	lb.	.02½
Arsenic, white, kegs	lb.	.05	Quartz, powdered	ton	\$30.00
Asphaltum	lb.	.35	Rosin, bbls.	lb.	.04½
Benzol, pure	gal.	.60	Rouge, nickel, 100 lb. lots	lb.	.25
Borax Crystals (Sodium Biborate), bbls.	lb.	.04½	Silver and Gold	lb.	.65
Calcium Carbonate (Precipitated Chalk)	lb.	.04	Sal Ammoniac (Ammonium Chloride) in casks ..	lb.	.05½
Carbon Bisulphide, Drums	lb.	.06	Silver Chloride, dry, 100 oz. lots	oz.	.42½
Chrome Green, bbls.	lb.	.25	Cyanide (fluctuating)	oz.	.52½-.57½
Chromic Sulphate	lb.	.30-.40	Nitrate, 100 ounce lots	oz.	.36½
Copper—Acetate (Verdigris)	lb.	.23	Soda Ash, 58%, bbls.	lb.	.02½
Carbonate, bbls.	lb.	.21½	Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.18
Cyanide (100 lb. kegs)	lb.	.45	Hyposulphite, kegs	lb.	.04
Sulphate, bbls.	lb.	.67	Nitrate, tech., bbls.	lb.	.04¾
Cream of Tartar Crystals (Potassium Bitartrate) ..	lb.	.27	Phosphate, tech., bbls.	lb.	.03¾
Crocus	lb.	.15	Silicate (Water Glass), bbls.	lb.	.02
Dextrin	lb.	.05-.08	Sulpho Cyanide	lb.	.32½
Emery Flour	lb.	.06	Sulphur (Brimstone), bbls.	lb.	.02
Flint, powdered	ton	\$30.00	Tin Chloride, 100 lb. kegs	lb.	.36
Fluor-spar (Calcic fluoride)	ton	\$70.00	Tripoli, Powdered	lb.	.03
Fusel Oil	gal.	\$4.45	Wax—Bees, white, ref. bleached	lb.	.60
Gold chloride	oz.	\$12.00	Yellow, No. 1	lb.	.45
Gum—Sandarac	lb.	.26	Whiting, Bolted	lb.	.02½-.06
Shellac	lb.	.59-.61	Zinc Carbonate, bbls.	lb.	.11
Iron Sulphate (Copperas), bbl.	lb.	.01½	Chloride, casks	lb.	.06¾
			Cyanide (100 lb. kegs)	lb.	.41
			Sulphate, bbls.	lb.	.03½